# Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXII, No. 1 | FEATURING: POWDER METALLURGY | January 1949







(Continued on Back Cover)

# Metals Review

THE NEWS DIGEST MAGAZINE

RAY T. BAYLESS, Publishing Director — MARJORIE R. HYSLOP, Editor — GEORGE H. LOUGHNER, Production Manager

VOLUME XXII, No. 1 — JANUARY, 1949

## A.S.M. REVIEW OF METAL LITERATURE

Ore Beneficiation ... 23
Preparation and Concentration

Smelting, Reduction and Refining ... 23
(Including Electrolytic Refining)

Properties ... 25
Physical, Mechanical and Chemical

Constitution and Structure ... 28
Metallography, Constitution Diagrams, Crystal Structure

Powder Metallurgy ... 29
Processes and Products

Corrosion ... 29
Theory, Measurement, Prevention (Except Coatings)

Cleaning and Finishing ... 30
Chemical and Mechanical; All Types of Coatings Except Electrodeposited

Electrodeposition and Electrofinishing ... 33
(Plating, Electropolishing, Electroforming)

Physical and Mechanical Testing ... 35
(Except Quality Control and Stress Analysis)

Analysis ... 36
Qualitative and Quantitative; Identification Methods

Apparatus, Instruments and Methods ... 38
Industrial Measurement and Control (Except Temperature); Laboratory Equipment and Procedures

Inspection and Standardization ... 40
(Including Quality Control, Radiography, Specifications)

Temperature Measurement and Control ... 40

Foundry Practice ... 41
Methods and Equipment (Except Furnaces)

Scrap and Byproduct Utilization ... 42

Furnaces and Heating Devices ... 42
(Including Induction and Resistance Heating Equipment)

Refractories and Furnace Materials ... 43

Heat Treatment ... 44
(Including Flame Hardening, Induction Heating, Cold Treatment)

Working ... 45
Rolling, Drawing, Forging, Stamping and Presswork, Shot-Peening

Machining ... 46
(Including Tools, Machinability and Cutting Fluids; Excluding Flame Cutting)

Miscellaneous Fabrication ... 48
General Manufacturing and Assembly Procedure: Plant Operations; Materials Handling

Joining and Flame Cutting ... 49
Welding, Brazing and Soldering

Applications ... 51
General and Specific Uses of Metals

Design and Stress Analysis ... 52
Metallurgical Factors in Design of Parts, Equipment and Structures

Statistics ... 53
Resources, Supplies, Production

Miscellaneous ... 54
(Including Research, Lubrication and Friction; Other General and Unclassified Subjects)

New Books ... 56

## SPECIAL FEATURES

Powder Metallurgy, by Wallace W. Beaver ... 5
Postwar manufacturing developments and new applications, based on the technical literature for 1947-48

Western Metal Congress ... 8
Committee appointments announced

Reports of Lectures and Meetings ... 8-21
Important subjects include ore resources, welding metallurgy, finishes for sheet steel, materials for jets and rockets, stainless steel classification, retained austenite

Practical Problems of Machinability, by Chester M. Inman ... 16
The second portion of Lecture III in the series on "Working of Steel"

## DEPARTMENTS

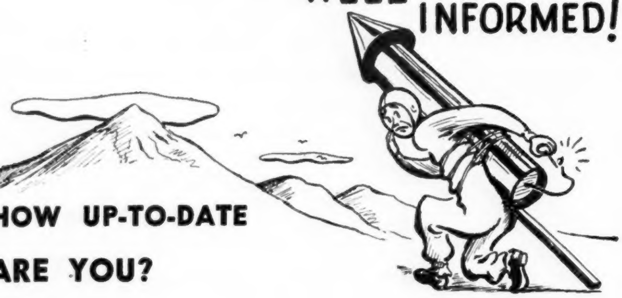
The Reviewing Stand ... 9
Thirty Years Ago ... 13
Manufacturers' Literature ... 57
Reader Service Coupon ... 57
Meeting Calendars ... 58-59
Employment Service Bureau ... 59
New Products in Review ... 60-63
Advertisers Index ... 63

*Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Harold K. Work, President; Arthur E. Focke, Vice President; William H. Eisenman, Secretary; E. L. Spanagel, Treasurer; E. G. Mahin, C. M. Carmichael, F. J. Robbins, Harry P. Croft, Trustees; Francis B. Foley, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.*

# TO REACH THE HEIGHTS


**. . . in the metal industry, just as in any other business or profession**

## YOU MUST BE WELL INFORMED!



**HOW UP-TO-DATE ARE YOU?**

Try yourself out on these ten questions. They are all based on current metallurgical developments mentioned in this issue of Metals Review. Just follow these three steps:

1. Read each question and mark the answer you believe to be correct.
2. Then check the clues given below each question and indicate where the answer can be found in this issue of Metals Review.
3. Then fill in your name, title and company connection, tear out and mail. That's all.

The names of all who submit ten correct answers by Feb. 15 will be published in the March issue. Get your name on Metals Review's Honor Roll of the Well Informed.

Name . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Title . . . . . . . . . . . . . . .

Company . . . . . . . . . . . . . . . . . . . . . . . . . . . . . A.S.M. Chapter . . . . . . . . . . . .

Mail to Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio

1. Drawing of aluminum, steel and brass to depths up to 9 in. in one-stage die operations without excessive workhardening is made possible by:
   (a) Heating of the dies
   (b) Use of a new type petroleum-base lubricant
   (c) Annealing before drawing
   (d) A preliminary cold rolling operation

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

2. Graphitic nitralloy possesses the properties of nitrided nitralloy, but also has the following added feature:
   (a) Machinability
   (b) Weldability
   (c) Ductility
   (d) Corrosion resistance

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

3. Molten salt bath descaling involves the following principle:
   (a) Solution of the surface scale in the salt
   (b) A chemical change in the surface scale rendering it readily removable in acid
   (c) A physical cleaning action in which the salt replaces the scale and is then readily washed off
   (d) An electrolytic action

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

4. Factors contributing to weldability of alloy steel plate include:
   (a) High hydrogen type flux
   (b) High welding speed and heavy deposits
   (c) A composition containing ferrite-forming elements in preference to carbide-forming

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

5. For optimum heat transmission in strip-coil annealing, the most important factor is:
   (a) Conduction through the film
   (b) Radiation
   (c) Metallic contact

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

6. A simple form of accelerated atmospheric corrosion test utilizes:
   (a) A warm, humid atmosphere containing $SO_2$
   (b) A hot, dry atmosphere containing $H_2S$
   (c) A room-temperature atmosphere saturated with nitric acid vapor

The answer is found in A.S.M. Review of Current Metal Literature, Item No. . . . . . . . . .

7. Porous alloys of high permeability and strength have been developed for "sweat cooling" of jet engine components. The method involves:
   (a) A combination of thermosetting resins and metal powder
   (b) Mixing the powder with ammonium carbonate, which gasifies on sintering
   (c) Hot pressing using a plastic to improve flowability

The answer is found in the news and feature section, January Metals Review, page . . . . . . . .

8. The cause of toughness in quenched steels when tempered at 400° F. or below, and also the cause of brittleness when the same steels are tempered at 500° F. and above, is:
   (a) Retained austenite
   (b) Precipitation of carbides
   (c) Holding at temperature for one hour or less
   (d) Graphitization

The answer is found in the news and feature section, January Metals Review, page . . . . . . . .

9. Metal-ceramic mixtures are being promoted for jet engine components because of their resistance to high temperature combined with:
   (a) Improved workability
   (b) Fatigue strength
   (c) Resistance to thermal shock
   (d) Creep resistance

The answer is found in the news and feature section, January Metals Review, page . . . . . . . .

The Western Metal Congress will be held in:
   (a) San Francisco in March
   (b) Los Angeles in April
   (c) Seattle in May
   (d) Portland in April

The answer is found in the news and feature section, January Metals Review, page . . . . . . . .

# Powder Metallurgy

By Wallace W. Beaver

***Postwar Manufacturing Developments and New Applications, Based on the Technical Literature for 1947-48***

A TREMENDOUS boost was given to manufacturing facilities for powder metal products during the war, accompanied by considerable popular publicity. Powder metallurgy was found adaptable to the manufacture of large numbers of small parts for ordnance, and at the same time production of bearings and sintered cutting tools was considerably expanded. In addition, the unavailability of European powders led to the opening of a number of new powder producing facilities in this country, as well as the expansion of existing ones.

Since the war, interest in powder metallurgy has not decreased, as evidenced by the number of publications and the research effort in this field. Postwar developments in powder metallurgy are traced in this article by reviewing the literature on the subject, chiefly for the past two years.*

A good part of the recent literature is concerned with product research and development. A considerable number of articles are also devoted to practices used by the highly developed wartime German powder metallurgy industry. Most of these have been examined by allied intelligence teams and their findings have been pretty well correlated.

Although considerable secrecy still exists concerning specific processes, dissemination of ideas has been increased by numerous symposiums and technical gatherings, both here and abroad. The first international symposium on powder metallurgy was held this summer at Graz, Austria (5a-49, Oct., 1948*).

Noteworthy efforts have been made to compile and digest the rather scattered literature on powders since the war. For instance, a new magazine, *Powder Metallurgy Bulletin,* has been published, several books (27-148, 1947; 27a-7, Feb., 1948) and a government publication listing all U. S. patents on powder metallurgy from 1836 to 1947 (27-230, 1947).

*Literature references are cited by the corresponding item number in the Review of Current Metal Literature instead of repeating the entire title, author, and source, this information can be obtained by referring to *Metals Review* for the month indicated in 1948, or the 1947 bound volume of the A.S.M. Review of Metal Literature (Volume 4).

A badly needed addition to the field has been the formation of the Metal Powder Association—a group whose purpose is to secure and distribute statistical information and establish standards for metal powders. Little information was previously available as to production and use of iron and copper powder on a weight basis, and few accepted standards had been issued. Since 1946, standards for sampling of powder, measuring flow rates, apparent density, particle size, and determining hydrogen loss in iron have been formulated. Ziegfeld (5a-17, May 1948) reviews the activities of the Metal Powder Association and gives statistics to show growth in the industry.

Shipments in grain copper and iron powder, representing about 90% of American production, show that copper powder manufacture in 1947 was 31% higher than in 1945 and 16% more than in 1946, while iron powder shipments were 55% higher last year than in 1945 and 22% greater than in 1946. In addition, the iron powder available has been considerably increased by Swedish imports which were negligible in 1945 but amounted to one-third of the total powder used in 1947, a strong bid to recapture the prewar market.

The chief use of both iron and copper powder was in bearings; friction material and brushes ran second for copper, and magnetic cores second for iron. The use of iron powder as unsintered cores has increased much more than for sinter bodies, the former showing a production increase of 45% in 1947 over the previous year. Patch (5-34, 1947) points out that average monthly production during the first eight months of 1946 was 88,000 lb. for magnetic cores and 210,000 lb. for bearings and bushings. Since the powder used in the radio industry is much more costly, the dollar value of the powder cores is greater than that of sintered iron.

Although iron powder capacity available in this country is 10,000 to 12,000 tons per year, it apparently is not fully in use (5a-2, Feb. 1948). Sachse (26-70, 1947) attributes this to the relatively high price of iron powder (8 to 12c per lb.) compared with the wrought material, which makes it difficult for iron to compete except for the manufacture of large amounts of small pieces which show a favorable economic balance on saving of scrap losses and eliminating machining operations. This price ratio is higher for iron than for other metals, and consequently, iron powder is surpassed in tonnage production by at least three metals; namely, zinc, copper, and aluminum. (Figures for these metals apparently include the use of powder as pigments in the paint industry.)

The present expansion of powder metallurgy, therefore, appears to be concentrated in those fields which can utilize the advantages of surface properties, porosity, or segregation of material content. Less progress has been reported in direct competition with other more common fabrication methods.

## Products

**Porous Metals** — The most natural products of powder metallurgy are those which take advantage of the porosity of partially consolidated powders. Filters and bearings have long been and still are among the most important products.

A new adaptation involves the development of porous alloys of high permeability and strength for "sweat cooling" of jet-engine components (5a-24, June 1948). The maximum permeability for a given porosity is achieved by mixing a totally decomposable material (such as ammonium bicarbonate) with the powder before pressing. The gasification of this substance during sintering produces a closely connected pore system nearly eliminating sealed porosity. This method can be used to produce porous parts from a variety of materials, including porous stainless steel and Ni-Mo-Fe alloy.

Porous stainless steels, as well as the older copper alloy filters, have been produced in a variety of shapes and forms including sheet, tubing, and irregular shapes. Present-day uses of these materials (5-72, 1947) include breather vents, flame arresters, filters for selective separation of liquids, high surface area electrodes, catalysts and catalyst supports, heat-transfer surfaces, pressure snubbers, control of liquid flow, and application of vapors and

liquids to surfaces in the printing industry.

The pore system in sintered materials is put to good use in an iron-copper alloy produced by impregnating the pores of sintered iron with molten copper (5-56, 1947). Attractive physical properties are claimed for this material. The infiltration method can be employed not only to eliminate pores in sintered powder (and thus enhance physical properties), but also to produce metal or metal-nonmetal combinations as desired. The infiltration process for the production of refractory alloys and combinations of oxides and metals has been outlined by Goetzel (5a-26, June 1948).

Judd and Tait (5-4 and 5-5, 1947), discussing some products of powder metallurgy in the automobile and aircraft industries, include such well-established items as friction plates, brushes, bearings and bushings. Less common objects are oil pump gears made of plastics, bonded, or infiltrated iron; light-weight aluminum bushes and thrust washers; reinforced babbitts; and noiseless auto body hardware. Combinations of thermosetting resins and metal powder are used in molded instrument panels, window trim, and cover plates. These are claimed to have most of the attributes of metal with the added advantage of freedom from tarnish and control of color effects.

Porous aluminum bushings are credited with load capacities equal to bronze although showing a 77% weight reduction. Aluminum also resists changes of temperature and corrosive atmospheres unsuitable to bronze or iron. In auto body hardware the presence of pores in sintered iron insures a permanent grease packing, so that well-oiled door latches and lock plates can be had without the annoyance to passengers of soiled clothing and hands.

Reinforced babbitts are produced by sintering copper-nickel powder onto steel backing to form a metal sponge and casting the babbitt into the pores under vacuum. Load carrying capacity is said to be considerably increased over ordinary babbitt but is still less than that of steel-backed lead-bronze. Because of the difficulty of casting high-lead copper alloys, these bearings are mass-produced by spreading copper-lead alloy powder on a strip of steel, sintering, and rolling (5-68, 1947).

**Hard Metals; Refractory Materials** —Among the oldest uses for metal powder sintering are to form solid material from powders of refractory metal and to bind hard materials (of high-melting point) by using a softer metal (of low melting point). Tungsten, molybdenum and other metals of high melting point are formed directly from the powder, while examples of the use of a second material to bind a hard substance are found in the sintered tool, industrial diamond, and friction plate industries.

Some recent applications of these methods are the electric arc fusing of chromium, carbon, manganese, silicon, and iron powders to produce a high-temperature corrosion resistant smoke exhaust fan (6-182, 1947) and the use of iron, cobalt and nickel to reduce the sintering temperature of silicon carbide to form light, fire resistant walls (5c-22, 1948).

In spite of considerable publicity concerning production and uses of sintered carbide, no great changes in method or composition appear to have been made recently. Some experiments with boron carbide and boride tools have been reported from Germany (5c-1, Feb. 1948) while Kieffer (4c-51, Sept. 1948) has described German results with a nickel-bonded alloy of titanium carbide with vanadium and molybdenum carbide. However, neither of these materials approaches the properties of the conventional tungsten-titanium or tungsten-tantalum carbides.

A relatively new use for metal powders which is closely akin to sintered tool materials is the production of a "ceramets" or ceramic-metal combinations for high-temperature use. According to Boles (5a-51, Oct. 1948), ceramic-metal compounds for use in rocket and jet engines include mixtures of oxides, carbides, nitrides, borides, and silicates with metals and alloys. These may be manufactured by vapor plating or flame spraying the metal on the ceramic before consolidation; infiltration of the metal into a porous ceramic skeleton; or by direct hot or cold pressing. In any event a bond between the metal and ceramic must be produced. Goetzel (5a-26, June 1948) indicates that specific oxides such as alumina can be combined effectively with nickel and cobalt with the aid of bridging metals such as molybdenum and tungsten.

**Loose Powders** — A quantity of metal powder is used in the unsintered condition as paint pigments, and as dust cores in communications equipment. The bulk of aluminum powder goes into paint, because of its adaptability to flaking. Aluminum flake can be dyed to poduce colored or polychromatic paints (7a-67, May 1948).

As previously shown, a large part of the iron powder consumed in the United States goes into dust cores, used to produce a high and constant permeability with low core losses. These powders are generally pure iron, permalloy or molybdenum-permalloy (5a-36, Aug. 1948).

Loose iron powder has also been used in the cutting of high alloys with an oxygen torch. The iron is introduced into the oxygen stream to aid the passage of flame through refractory oxides (22-111, 1947).

An established use for metal powders is as coating and flash getters in vacuum tubes (5a-61, Dec. 1948). Coating getters cover the electrodes while flash getters provide the mirror for the tubes. Powders of Ta, Zr, Th, and Th + Ce—Al alloy are used for coating, while the active material of flash getters is barium, sometimes combined with Al, Mg, Sr, or Ca.

**Materials with Unusual or Special Properties** — Hausner (5a-1, Feb. 1848) describes the use of ceramic-metal combinations for semiconductors. The range of $10^{-2}$ to $10^{6}$ ohm-cm. can be varied by changing either the particle size or the material as well as the resistance of the bond. An added advantage is found in the control of temperature coefficients, which may be either zero, negative, or may change continuously with temperature.

A stainless steel welding rod has been developed with unusual arcing characteristics (22-595, 1946). It is made by extruding iron, nickel and chromium powder with starch; sintering, and swaging to size. The metal transfer takes place in the form of spray and produces a very smooth bead.

Fernico, an iron-nickel-cobalt alloy having a low coefficient of expansion, is used as a glass-metal seal. While it can be produced by melting, sintering makes an alloy of greater purity and uniformity (5-77, 1946).

Permanent magnets are often made from powder, resulting in improved properties and greater ease of forming. Some of the new permanent magnet powder materials include the improved Al-Ni-Co modifications and the oxide or metal-oxide types (5a-18, May 1948).

Armatures for small motors and generators are produced by mixing reduced iron with ferrosilicon, pressing, and sintering (5-78, 1947). An advantage of the powder process is that resistivity can be controlled by the rate of sintering and the silicon diffusion.

**Solid Components** — Production of solid materials from metal powders in competition with other methods has not developed much since the war. Such large wartime programs as the German development of sintered iron driving bands (5b-20, June 1948) have not generally found peacetime parallels.

However, an interesting account by personnel of the Metallwerk Plansea (5-44, 1947) on sintered iron and steel for structural parts gives an idea of the possibilities of this application. After the war, this organization was able to resume production largely because powder could be made more readily than bar stock could be obtained; moreover, fabricating equipment was available. The plant made about everything possible by powder methods—heating and cooking units from iron and aluminum powders, keys, locks, latches, and other hardware, nails, bolts and nuts, as well as

ordinary powder metal products. Even replacement parts for the plant's machinery had to be produced locally by available processes.

The economics of manufacturing solid components by powder metallurgy, especially in a country with a relatively low price of bar stock and integrated machine tools, largely precludes its widespread employment. Small, mass-produced parts seem to be the primary American use to date, although certain advantages of pressing may force consideration on the basis of performance rather than economics. An example is a method of producing cavities for plastic molds (5-21, 1947) wherein a die can force a deeper hole of irregular shape into the powder than can be machined in solid metal.

## Methods and Equipment

One of the greatest difficulties in the pressing of metal powder is lack of plasticity. This limits both the size and shape of the finished piece and is one of the major drawbacks facing the fabrication of solid materials by powder metallurgy. Methods of overcoming this difficulty now being tried include hot pressing and the application of pressure to all sides.

Hot pressing is a promising technique which appears to have made little progress in commercial applications, largely because of the inability of die materials to stand up under the heat and pressure. A somewhat recent modification of the hot pressing process using a plastic to improve flowability of the powder mass was developed by Strauss (5-45, 1947). This involves resistance heating of the powder, containing polyvinyl acetate, while pressing to shape and allowing the plastic to vaporize and the gas to escape before applying the final pressure. Odd-shaped compacts were made by this method.

A press of 30 to 60 tons capacity has been manufactured by the DoAll Co. (5a-11, March 1948) which applies pressure simultaneously from all sides as well as top and bottom. This is similar to a method for pressing tubing in which the powder is packed against a steel mandrel, covered with a rubber diaphragm, and pressed in a hydraulic chamber. In other processes the powder is welded in a metal envelope and hot or cold rolled or drawn (5a-47, Sept. 1948).

A method for producing bearings in Germany involved the pressureless sintering of iron powder and the subsequent hot pressing of the sintered mass to size. Better control of porosity was claimed (5b-1, March 1948). A pressureless method of producing cylindrical bearings has been recently patented. In this process a loose powder or liquid slurry is deposited centrifugally and sintered in position.

New applications of metal infiltration and plastic bonding were mentioned earlier in this article.

## Powder Production

Alloy powders of all types are now on the market and include corrosion-resistant and high-temperature alloys, magnetic materials, copper and aluminum alloys, and carbon and alloy steels. They are manufactured by accepted techniques such as crushing, atomizing, and mixing of metal hydrides. Stainless steel powder (5b-2, March 1948) has many applications because of its corrosion resistance. To produce relaxed or ordered structures of Pt-Fe, Pt-Ni, and Pt-Co alloys, Weil (5-36, July 1947) reduces the respective metal platinocyanates in hydrogen.

Recent foreign literature discloses a method of cathodic precipitation of nickel from various electrolytes to produce a high-activity nickel powder suitable for catalysts (5-26, 1947). The production of V, Bi, Be, W, Mo, and other metals of extreme purity by alkaline metal reduction (5c-8, April 1948), and the preparation of powders by fused salt electrolysis (5a-53, October 1948), are other foreign developments.

Zirconium, which can be made with soft, easily machinable compacts, has been produced experimentally by calcium reduction of the oxide (2-77, 1947), while Isaza and associates (2-241, 1947) disclose a method of making tantalum and columbium powder by magnesium reduction. The pentachloride is produced by passing dried chlorine saturated with $CCl_4$ over the heated ore, and this is then reduced to metal powder in a liquid melt of KCl. The resulting powder is said to be finer than 9 microns.

Two German methods for atomizing iron were developed during the war (5a-23, June 1948). Large amounts of iron powder were required in Germany for ordnance components, especially driving bands for shells. The mechanical Hametag process had too low a rate of output and required considerable maintenance. To increase production of iron powder, two processes of atomization were successfully applied and would probably have replaced the Hametag method.

The disk atomization process consists of pouring low-carbon steel or low-silicon cast iron so that the molten metal falls into the apex of a water cone and is globularized into chilled plastic particles which in turn fall on and are distorted by stainless steel knives. The RZ process for manufacturing atomized iron involves the pouring of a special low-silicon cast iron into a stream of compressed air. The atomized powders, consisting of spherical fragments of iron and iron oxide, are annealed to a highly compactible powder.

Two recent electrolytic processes for producing iron are the electrolysis of a 10% ferrous ammonium sulphate in England (5b-10, June 1948) and the use of a ferrous chloride electrolyte with insoluble anodes in the U. S. (5-79, 1947).

*Wallace W. Beaver is engaged in research on engineering material at Battelle Institute. He holds a degree in metallurgical engineering from Renselaer Polytechnic Institute and a Master's degree in chemical engineering from Ohio State University. Before joining the Battelle staff in 1942, he was associated with the Federal Machine and Welder Co., Warren, Ohio.*

## Research and Classification of Powders

Although the bulk of the experimentation in the field of powder metallurgy is concerned with specific sintered products, some research has been carried out on the general problems of powder classification, pressing, and sintering.

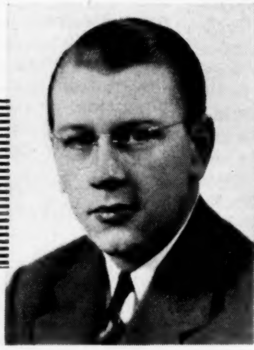
The theory of sintering is discussed by Schwarzkopf (5a-57, Nov. 1948), who again points out the close relationship between recrystallization and sintering. Three steps in sintering are (*a*) the formation of "point" bonds similar to dislocations in solid metal, (*b*) lateral growth of the bonds, and (*c*) the disappearance of isolated pores. However, unlike the recrystallization of cold-worked solids, the effect of free surfaces must not be neglected. Research in the field is mostly being done by Hedvall (5a-38, August 1948) and Huttig (5-17, 1947) who have been studying the effects of surface and surface conditions not only on the sintering reaction but also on magnetic properties (5b-22, July 1948).

A theory of sintering which does not involve recrystallization was developed by Shaler and Wulff (5a-27, June 1948). Concluding that the powder mass flows viscously under the influence of surface tension and pressure of atmosphere, they were able

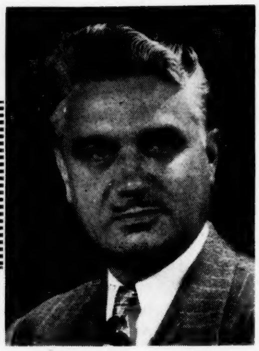
# Western Metal Congress Committee Appointments

*E. R. Babylon*

*James B. Morey*



*S. R. Kallenbaugh*



*W. J. Parsons*

Final committee appointments for the coming Western Metal Congress and Exposition have been made, according to an announcement by W. H. Eisenman, managing director of the event. The Western Metal Congress will be held in Los Angeles the week of April 11, 1949.

The General Committee, which has the responsibility for directing over-all policy of the Congress and Exposition, is headed by E. R. Babylon of the Kaiser Co., chairman of the Los Angeles Chapter of the American Society for Metals. Two vice-chairmen on this committee are James B. Morey of International Nickel Co. (vice-chairman of the Los Angeles Chapter), and S. R. Kallenbaugh of Timken Roller Bearing Co. W. J. Parsons, Pacific Scientific Co., will serve as secretary of the committee. Mr. Parsons is secretary of the Los Angeles Chapter.

Nine chairmen of other A.S.M. chapters will assist on Mr. Babylon's group. They are Stuart C. Gillespie, Pacific Metal Co., Seattle (Puget Sound Chapter); C. R. St. John, Permanente Metals Corp., Spokane (Inland Empire Chapter); B. L. Berlien, Industrial Steel Treating Co., Oakland (Golden Gate Chapter); R. J. A. Fricker, Dominion Bridge Co., Vancouver, (British Columbia Chapter); Raymond C. Aungst, Oregon Brass Works, Portland (Oregon Chapter); H. E. Fryer, Carnegie-Illinois Steel Corp., Denver (Rocky Mountain Chapter); Howell Drummond, Colorado Fuel & Iron Corp. (Pueblo Chapter); Earl Kops, Kops Engineering Service (San Diego Chapter); and Winfred C. Dyer, Geneva Steel Co., (Utah Chapter).

Other committee chairmen have been selected from members of the Los Angeles Chapter, as follows: Harry H. Beyma, Kaiser Co., Attendance Committee; Edgar Brooker, U. S. Spring and Bumper Co., Co-operating Societies Committee; W. W. Farrar, Farbest Corp., Entertainment; John E. Wilson, Climax Molybdenum Co., Registration; R. B. Grossman, Southern California Gas Co., Exhibits; Wm. F. Nash, Jr., C. F. Braun and Co., Program; Wm. E. DeRidder, General Metals Corp., Publicity.

## POWDER METALLURGY

(*Continued from page* 7)

to calculate shrinkage rates in copper by this method.

Sintering in the presence of the liquid phase was studied by Lenel (5a-37, Aug. 1948) and found to be complicated by additional diffusion effects and solid solution formatión. The application of the theory of diffusion to the formations of alloys in powder metallurgy has been analyzed by means of thin sheets of interleaved metal (5a-55, Nov. 1948).

Formation of alloys by diffusion of mixtures of powder has been studied experimentally for nickel steels (5b-7, March 1948) and carbon steels (5b-17, June 1948). Generally speaking, the diffusion times and temperatures are too great for practical purposes, but properties are improved if an alloy powder is used (for instance, iron carbide rather than iron and graphite).

The effects of particle-size distribution on physical properties of cold pressed metal powders were studied by Rostoker (5-69, 1947); optimum size ranges are reported. Plastic deformation in cold-pressed metal powders has been examined by means of deformable lead grids (5-19, 1947). The density patterns, deformation, and strain distribution could be determined by radiography.

Properties of iron powders as a function of the processing which they must undergo have been evaluated by Kuzmick (5b-5, March 1948), while Leadbeater (5b-11, June 1948) analyzes the effect of the various properties statistically. Such defining properties of powder as shape factor, density ratio (tap density, apparent density), compression ratio, and specific surface as well as the more common properties were determined. An appendix by Lea on the determination of specific surface by permeability is included in the paper.

As to research on specific products, the following references are important: Powder metal proucts from aluminum and magnesium (5d-2, Aug. 1948), the effect of particle size on electrical properties of copper-ceramic mixtures (5a-10, March 1948), the physical metallurgy of sintered carbides (5c-12, June 1948), powder metallurgy of copper (5c-18, June 1948), zinc (5c-23, Aug. 1948), and nickel (5-75, 1946).

## Role of Metallurgist in Motor Production Observed

Reported by G. F. Kappelt
***Metallurgist, Bell Aircraft Corp.***

Processes used to produce an average of 110 Chevrolet motors an hour were observed by the members of the Buffalo Chapter A.S.M. on a plant visitation to the Tonawanda Division, G.M.C. in November.

Prior to the tour, which included all departments of the plant, a complimentary dinner was served to the members. Starting with the raw block casting, the surface slab broaching, multiple boring and drilling, reaming, and grinding operations were followed. The tour then took in the straightening, machining and finish grinding of the various forgings, and ended with final asembly, including both a green and final run.

The control methods established by the metallurgist and the effective production role that he can play were quite evident to all who observed the various operations in this mass production plant.

# Taconite Ores Constitute Best Resource; Concentration Methods Being Perfected

Reported by O. G. Saunders
*Metallurgist, Hobart Manufacturing Co.*

Of prime importance to our national security and peacetime economy is the quantity, quality, and availability of our iron ore. Donald B. Gillies, vice president of Republic Steel Corp. and president of the Lake Superior Iron Ore Association, spoke to a joint meeting on Nov. 3 of the Dayton Chapter A.S.M., the Ohio Valley Section of the American Institute of Mining and Metallurgical Engineers, and the Engineers' Club of Dayton, on "The Future of Iron Resources".

Referring to the Great Lakes district, which supplies approximately 85% of our iron ore, Mr. Gillies remarked that at the present rate of mining—now in excess of 80,000,000 tons of ore per year—the known deposits of rich, easily available ore will be exhausted in from 10 to 15 years. However, there are large deposits of taconite, an iron-bearing rock, which have never been touched.

This ore, because of its relatively low iron content, cannot be shipped economically in the as-mined state, but must be concentrated. Pilot plants are now in operation to process this mineral, and magnetic taconite has been quite successfully

*Donald B. Gillies, Vice-President of the Republic Steel Corp., Addressing the Dayton Chapter*

concentrated. The nonmagnetic taconite presents a greater problem, but this challenge is being met and the ore has been experimentally concentrated. This ore must be ground to such a fineness that it has to be briquetted before it can be used in the blast furnace.

Mr. Gillies pointed out that there are extensive, rich iron deposits in South America, particularly in Brazil and Venezuela. However, the distances involved now make shipping this ore uneconomical. Neither should we want to jeopardize our national security by depending on an iron source outside our country.

Closer to home, important deposits of rich iron ore have been located in Labrador and Newfoundland, but, aside from their being outside our country, it would be necessary not only to transport the ore long distances by boat (presupposing completion of the St. Lawrence River Waterway), but it would also have to be carried by rail. And it costs as much to ship ore 100 miles by rail as it does to ship it 1000 miles by boat!

Mr. Gillies concluded, therefore, that it behooves us to prepare for the time when we must use the lower iron content ores. Though they seem to be in ample supply, they will be more costly than the ore we are now using.

### Titan Appoints Distributor

Fulton Supply Co., Atlanta, Ga., has been appointed distributor for brass and bronze rods by Titan Metal Mfg. Co., Bellefonte, Pa.

# The Reviewing Stand

DELVING AROUND in some A.S.M. archives the other day, one of our most prominent staff members found himself so engrossed with the memories provoked by these early issues of A.S.M. publications that he felt others might wish to share his reminiscences. Hence the new monthly feature starting in this issue on page 13.

Another feature, also designed as much to entertain as to enlighten the reader, is our brand new quiz contest on page 4. The quiz points up the fact that the primary function of *Metals Review* is to keep its readers up to date. We think it is more than pure coincidence that the day after the quiz page went to the printer the following letter was received:

*"I want to say that I think Metals Review is a great publication. It brings me up to date as to what is going on as no other publication in metals does."* [Name of our correspondent will be furnished on request; a photostatic copy of his letter will cost a skeptic 25c.]

### Standards Among Nations

Standardization—the principle from which rose modern American mass production methods (and thereby spewing millions of automobiles into hopeless traffic snarls)—has now reached the point where it is spreading into an international domain.

A much publicized instance is the recent unification of screw thread standards by the United States, Canada and Great Britain—a step largely prompted during World War II when Army maintenance crews were desperately handicapped in their attempts to repair American equipment with British screws and bolts. Almost literally, "For want of a nail a kingdom was lost".

Now we find in the January issue of *Metal Progress* a proposal that an international committee might be the best way to tackle the problem of standardizing the designations or symbols for constituents in phase diagrams. Such a project will probably be heartily applauded by the student who finds enough complexities in the fundamental iron-carbon diagram without having to remember that alpha iron is body-centered whereas alpha brass has a face-centered structure.

Finally we come to a field close to the vitals of *Metals Review* when we learn that an international engineering conference in London recommends that participating nations adopt the Universal Decimal Classification system for engineering literature. Perhaps a small step towards this commendable end will be taken on a national scale by the recently formulated committee to study metallurgical literature classification with a view to punch card filing. (See announcement on page 15.) While the Universal Decimal system may prove far too unwieldy for the limitations of punch cards, a simpler standardized classification scheme will at least get everybody going in the same direction. M.R.H.

# Improved Surface Finishes Enhance Sheet Steel

Reported by Morris Cohen
*Massachusetts Institute of Technology*

"The increased application of sheet steel in recent years has required the development of many new grades and finishes in order to combine the low cost and desirable mechanical properties of ferrous materials with enhanced corrosion resistance and attractive appearance," said Reid Kenyon, associate director of research of the Armco Steel Corp., addressing the November meeting of the Boston Chapter A.S.M. His talk on "Finishing Steel for Decorative and Protective Purposes" was warmly received by the audience because it touched on something of immediate interest to virtually everyone present.

*Photographer H. L. Phillips of the Boston Chapter A.S.M. Catches Some of the Officials at the Speakers' Table in a Jovial Mood. Left to right are John Chipman, former A.S.M. national trustee; Reid Kenyon, the speaker; Walter M. Saunders, Jr., technical chairman; and Morris Cohen, a member of the chapter Executive Committee*

Without minimizing the importance of the base metal, the speaker concentrated on five methods of surface preparation.

In the field of nonmetallic finishes, such as paints and lacquers, the development of the phosphate treatment for improved adherence has been a major contribution. This process can now be applied by the manufacturer before the sheets are shipped from the mill.

The second group of finishes includes the metallic coatings—electroplated chromium, nickel and copper, and hot-dipped zinc, tin, terne and aluminum. Aluminum coatings have good heat resistance, and are used for automobile mufflers, burners and oven liners. The recently developed Zincgrip sheet is made by an improved process of hot-dip galvanizing in which the undesirable brittle alloy layer is eliminated. A third type of surface finish is a combination of a metallic coating with special preparation to receive a nonmetallic coating, such as paint, lacquer or asphalt. A most intriguing example cited by Mr. Kenyon was a galvanized surface with asbestos fibers embedded in the zinc coating, thus forming an interlocking base for a thick layer of asphalt. This composite is used for culverts to withstand difficult conditions of abrasion and corrosion.

Porcelain enamels have undergone much improvement in recent years from the standpoint of adherence, acid resistance, shock resistance and cost. Enamel finishes are easy to clean, and can be made in attractive, permanent colors.

Finally, there are the various polishing treatments applied to stainless steels, ranging from dull to mirror smooth finishes. Decorative effects are obtained by electropolishing on dull surfaces or by sand blasting on polished surfaces, using suitable stencils and masking devices. Aside from good appearance, the surface finish of stainless steel demands attention because oxide scale, pits and rolled-in dirt are injurious to corrosion resistance.

Mr. Kenyon brought home the overall importance of sheet steel finishes in our economy by pointing out that flat-rolled products constitute about one-third of the total steel production in this country.

## Ryerson Adds to Main Plant

Joseph T. Ryerson & Son, Inc., has begun construction of a large brick and steel addition to the Chicago plant, which will provide approximately 118,000 sq. ft. of modern plant and office space. Completion is scheduled for November 1949.

The company operates what is known as a steel-service business, supplying bars, plates, structurals, sheets, strip, tubing and other steels from stock. The Chicago plant, which occupies three entire blocks, is said to be the largest of its kind in the world.

## Motor Assembly Plant Inspected in Warren

Reported by E. W. Husemann
*Metallurgist, Copperweld Steel Co.*

The new Thomas Road plant of the Packard Electric Division of General Motors Corp. was the scene of a plant visitation by members of the Warren Chapter A.S.M. on Nov. 11. Following dinner at the El Rio Cafe, Jean Blair, director of personnel for Packard, and M. G. Shirey, superintendent, made short addresses. The group then left by automobile for the plant, where fractional horsepower motors are built up and assembled.

Approximately 50 members and friends viewed the punching and assembling of the 488 parts that go into the average motor, and the painting and testing of the finished motor. Since the tour, which ordinarily takes 35 min., required 1½ hr. on this occasion, high interest was evident. All present were appreciative of the smooth, efficient handling of the group, and of the excellent descriptions and explanations provided by the guides.

## Manufacture of Welded Armaments Depicted

Reported by Howes Bodfish
*Aluminum Co. of America*

The members of Moscow's Politburo were unfortunately absent from the November meeting of the Baltimore Chapter A.S.M. when Merrill A. Scheil, director of metallurgical research, and J. J. Chyle, director of welding research of the A. O. Smith Corp., showed how a democratic (U.S. definition) enterprise can convert to the production of armaments. Their sabres would rattle more softly had they been present.

Messrs. Scheil and Chyle presented a profusely illustrated exposition of the problems and the solutions reached in the manufacture of welded bombs, pressure vessels, torpedo airflasks, hollow aircraft propeller blades and hollow crankshafts for diesel engines.

Mr. Scheil showed how, by correct interrelation of selected welding materials and heat treatment methods, it is possible to weld high-tensile steels and obtain strength in the weldments at least as high as those in the parent steels.

Tooling and testing methods were presented in some detail.

Members of the American Welding Society were guests at the meeting, and George E. Linnert, chairman of the local A.W.S. chapter, acted as technical chairman.

# Entire Field of Ferrous Metallurgy Is Involved in Welding Techniques

Reported by G. F. Kappelt*
*Chief Metallurgist, Bell Aircraft Corp.*

The process of welding was likened to steelmaking by A. B. Kinzel, president of Union Carbide and Carbon Research Laboratories, in a talk before a joint meeting of the Buffalo Chapters of A.S.M. and the American Welding Society.

Many properties of deposited weld metal are quite different from those obtained in the same alloy produced as wrought steel. For one thing, the inherent grain size of the weld metal is usually small when compared with that of wrought steel. Secondly, the impact properties of weld metal, especially at lower temperatures, are usually better than those of wrought steel. Finally, the strength of the weld metal is usually high because it has received a thermo quench by the cold material surrounding the weld (equivalent to a water quench in the heat treat department).

Dr. Kinzel believes that welding is still developing rapidly. He showed the tremendous increase in the number of welded assemblies now being used and dropped a hint as to the possible future of welding when he expressed the belief that in a few short years, commercial welding operations will be carried out on material as thick as ¼ in. at speeds of 400 to 500 ft. per min. It is Dr. Kinzel's further belief that as welding speeds increase, the properties of the deposited metal will be improved.

Reported by H. H. Benninger*
*Peninsular Steel Co.*

The entire field of ferrous metallurgy is involved in one or more of the several welding techniques in use today, A. B. Kinzel, president of the Union Carbide and Carbon Research Laboratories, pointed out in a talk before the Detroit Chapter A.S.M. at the November meeting.

*Dr. Kinzel Addressing the Detroit Chapter A. S. M.*

For comparative purposes, the part being welded can be thought of as a mold into which the molten rod is cast; rolling or forging has its welding counterpart in pressure welding processes; the several phases of heat treatment occur as the rod is deposited on the colder work (quenching), and is subsequently tempered by later metal depositions or post heating.

A knowledge of metallurgical factors involved aids in the most economical solution to welding problems. Often the first cost of material is not a proper index of the final cost of a weldment. It has been amply demonstrated, for example, that the use of high-strength, low-alloy plate will in the end be cheaper than carbon plate on weldments. This is due in part to material saving, part to the greater ease of welding, and part to the higher unit strength of the weld.

At the dinner meeting prior to the technical lecture, L. A. Skragg, chief research engineer of Radio Station WWJ-TV, discussed the problems associated with televising sports events.

*Excerpts covering different aspects of Dr. Kinzel's talk have been selected from both Mr. Benninger's and Mr. Kappelt's reports—Ed.

## Standard Cold Finished Steels Offer Economies

Reported by Willard Roth
*Industrial Heating Engineer*
*Westinghouse Electric Corp.*

Thomas D. Taylor, metallurgical engineer of Bliss & Laughlin, Inc., presented a movie and talk on "Cold Finished Steels" before the Northwestern Pennsylvania Chapter A.S.M. on Nov. 18. The movie traced the making and processing of steel from the blast furnace to the cold mills and drawing dies of the cold finishing mill.

In the talk, Mr. Taylor, assisted by Deppen Kline, described the methods of quality control used in the modern mill. His main theme, however, was an excellent delineation of the uses and limitations of the standard S.A.E. and A.I.S.I. cold finished steels.

Mr. Taylor emphasized the savings which engineers and metallurgists can make by using standard steels in contrast with the extra charges made for special analyses, which oftentimes differ only slightly from the standard.

# New Materials Lengthen Life of Jets and Rockets

Reported by D. W. Grobecker
*Los Alamos Scientific Laboratory*

Jet and rocket engine life and efficiency can be greatly increased through the development of suitable materials more resistant to high temperatures. This possibility was elaborated on by Major R. A. Jones, Air Material Command, Wright Field, in a discussion before the Los Alamos Chapter A.S.M.

Utilizing the alloys now in use, operating temperatures of jet engines may be elevated a few hundred degrees by improved design to eliminate localized "hot spots." Development of new materials is progressing along four channels: (a) metallic alloys, (b) ceramics, (c) ceramic coatings on metals, and (d) sintered ceramic-metal compacts.

Among new metallic alloys molybdenum-base alloys hold promise for higher temperature use.

The utilization of most ceramic materials, including nitrides, carbides, borides, and graphite, as well as oxides, must be approached in a manner consistent with their thermal shock characteristics. For certain applications the high refractiveness of these materials is an advantage. Ceramics may be adopted for parts in which thermal cracks cause no harm, and in applications such as rockets, where the material can be fully supported by stress-bearing metal parts.

Ceramic coatings on metal parts are similar to the porcelain enamels used on household stoves and refrigerators, except that ceramics with a high maturing temperature (instead of low) are desired. Ceramics with an exceedingly high maturing temperature can be used without deleterious effects on the base metal by impinging the ceramic on the metal through a flame. Double ceramic coats with the base coat having a maturing temperature lower than the top coat offer possibilities.

Work is being done on the development of metal-ceramic mixtures to combine resistance to high temperatures and thermal shock. Sintered metallic carbides with cobalt binder show promise. Considerable experimentation has been performed on compacts of aluminum oxide and chromium. When the mixture is sintered in a controlled atmosphere, some $Cr_2O_3$ is formed which has complete solid solubility with $Al_2O_3$. The solution of a portion of the adhesive chromium oxide promotes a strong bond between the particles. The thermal shock characteristics of this mixture are not known, but the possibility of increased ductility and thermal conductivity is indicated.

# Difficult Aircraft Production Jobs Are Pressure Welded

Reported by Charles J. Carlson
*Metallurgist, Wyman-Gordon Co.*

Pressure welding, a relatively new method of joining, is unique in that there is no fusion at the weld, nor is filler metal used, Stephen M. Jablonski, metallurgist for Wyman-Gordon Co., told the members of the Worcester Chapter A.S.M. on Nov. 10. Mating faces to be welded are generally ground flat and heated, either with the faces pressed together or separated.

*S. M. Jablonski*

The most common method is to hold the faces together under pressure while heating, and when the faces have reached welding temperature, increase the pressure enough to cause upsetting. Pressures vary from 1500 to 10,000 psi., and temperatures used are 2200 to 2300° F., depending on the type of steel welded. Tests through the weld show mechanical properties approaching those of the base metal. The most difficult single property to reproduce is reduction of area.

Applications of pressure welding are varied. Two examples of difficult production jobs are stainless rings and propeller blade hubs. Since both of these jobs are aircraft parts, quality control is highly important. Stainless rings are welded in two halves, and forged to coining dimensions. The forging acts as a check on the quality of weld because the ring will split open if not properly welded.

Welding propeller hubs presents an even more complicated problem because of size, alloy and contour of the two halves. Control of the heating cycle and amount of upset are two of the most important variables. The upset bead has to be machined off to avoid a notch effect in heat treating. The hubs also require an isothermal anneal to avoid air hardening, which is characteristic of the S.A.E. 4350 analysis used. All welded assemblies are subject to Magnaflux examination, and a certain percentage of every lot is cut up for tensile tests and acid etch examination.

### Reduced Rate Subscription Offered

Starting with this issue, *Metals Review* will print the A.S.M. Review of Current Metal Literature on consecutive pages, using both sides of the sheet. This change in format is necessitated by the fact that this continually expanding feature requires more single pages than are available in one issue.

To accommodate those who wish to clip and file individual annotations or sections, a second subscription is offered at the nominal cost of $2.00 per year.

The $2.00 rate is available to A.S.M. members who already receive *Metals Review* on their memberships and who wish to have a second copy for clipping purposes.

## Distributors for Cladmetals

Distributors in Canada and Wisconsin have been appointed by American Cladmetals Co. for its product, Rosslyn Metal. Hugh Russel & Sons, Ltd., of Toronto and Montreal will be the exclusive distributor in Canada, and the Bell Sales Co., Milwaukee, will handle the state of Wisconsin. A national sales system is now being developed for American Cladmetals and distributors will be named in many areas, according to Joseph Kinney, Jr., president.

## Theories on Toughness of Hardened Steel Presented

Reported by R. E. Christin
*Columbus Bolt and Forging Co.*

A public relations department for the engineering profession was advocated by J. R. Van Pelt, director of research education, Battelle Memorial Institute, at the Oct. 12th meeting of the Columbus Chapter A.S.M. The work of engineers and other scientists should bring people together, and should provide tools for the construction instead of destruction of materials, the speaker said.

The technical speaker was Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp. In an enlightening discourse he attributed the cause of toughness in quenched steels, when tempered at 400° F. or below, and the cause of brittleness when the same steels are tempered at 500° F. and above, to the precipitation of carbides, and not to retained austenite. Exceptional photomicrographs were used to illustrate the lecture.

Lively discussion was participated in by such local notables as Messrs. Harder, Hoyt, Walters and Lorig of Battelle, and Dr. Spretnak of Ohio State University.

# Simple Classification For Stainless Steel Avoids Confusion

Reported by H. A. Johnson
*Gear Engineer, Aircooled Motors, Inc.*

Presenting "The Story of Stainless Steel" before the Syracuse Chapter A.S.M. on Nov. 3, Carl A. Zapffe introduced for the first time many illustrations from his book of this title, soon to be published by the American Society for Metals.

The many grades of stainless steel were first reduced by Dr. Zapffe to a simple division into three classes on the basis of a generally increasing alloy content. This avoids certain confusions entailed in the use of the common terms "martensite" and "hardenable"—martensitic steels are not always martensitic, and stainless steels can be hardened by cold work, precipitation of sigma phase, and other means besides martensite.

The relationships of these various classes were then uniquely illustrated with many original slides showing alloy content, corrosion resistance, and cost, in such a way that engineers, salesmen and shop men could easily grasp and convey to others information normally found only in comprehensive tables.

Introducing his talk with some regaling stories on the early development of stainless steel and its many and complicated litigations, the speaker continued with a descriptive treatment of the part played by each alloying element (carbon, chromium, nickel, and others) in producing the excellent mechanical properties and the surpassing corrosion resistance of these unusual alloys. Among dangers to be avoided in using stainless steel, the speaker described 475°C brittleness, sigma phase, and sensitization. Loss of notch-impact resistance in Class II ferritic grades was illustrated by some remarkable fractographic slides.

Discussion following the lecture dealt with specific problems in stainless steel, notably the effects of hydrogen embrittlement and the possibilities of securing relief from this source of trouble by a recent development in pickling inhibitors.

Prior to Dr. Zapffe's lecture a brief exposition of "Avenues of Communication in a Factory" was presented by C. N. Howard, public relations department, New Process Gear Corp. Mr. Howard's "avenues" represented the various means by which management-worker relationships are maintained.

**How Well Informed Are You? See Quiz on Page 4**

# THIRTY YEARS AGO

Volume 1, number 1 of the *Journal* of the American Steel Treaters Society made its bow in October 1918. At that time the *Proceedings* of the Steel Treating Research Society had been in existence since 1917. These two organizations were to amalgamate in 1920, forming the American Society for Steel Treating, later changed to the present American Society for Metals.

—30—

The first issues of these publications contain such well-known names as Ted Barker and Billy Woodside, founder members; Sir Robert Hadfield of England, who later became the first honorary member of the society; Emil J. Janitzky, then as now with Carnegie-Illinois Steel Corp. (Illinois Steel Co. at that time); and Frank B. Lounsberry, then metallurgist for Atlas Crucible Steel Co., now vice-president of Allegheny Ludlum Steel Co. (also the same company).

—30—

Janitzky's paper in the *Journal* was a mathematical discussion of the influence of size on heat treating — a subject which later won him the Henry Marion Howe Medal for the best paper in the society's publication. Relation of mass to heat treatment was a topic of much discussion at that time, as witness an earlier paper by Lawford H. Fry of Standard Steel Works Co. on "The Effect of Size in the Heat Treatment of Steel". This paper appeared in the second issue of the *Proceedings,* September 1917.

—30—

Lounsberry's article was entitled "Modern Methods of Toolsteel Manufacture"; it dealt mainly with the crucible process!

—30—

A general address on "Metallurgy" was contributed by Sir Robert Hadfield, in which he presented a table showing a "Comparison of Brinell Ball and Scleroscope Hardness Numbers With Compression Strength, Yield Point and 'Tenacity' of Steel" (single quotes by the editor).

—30—

Sir Robert's interest in hardness testing was further evidenced in Vol. 1, No. 6 of the *Proceedings,* which carries his offer of a prize of £200 for a new method of determining the hardness of metals in the very high ranges—Brinell 580 and up. (Subsequent issues do not indicate whether or not the prize was awarded.)

—30—

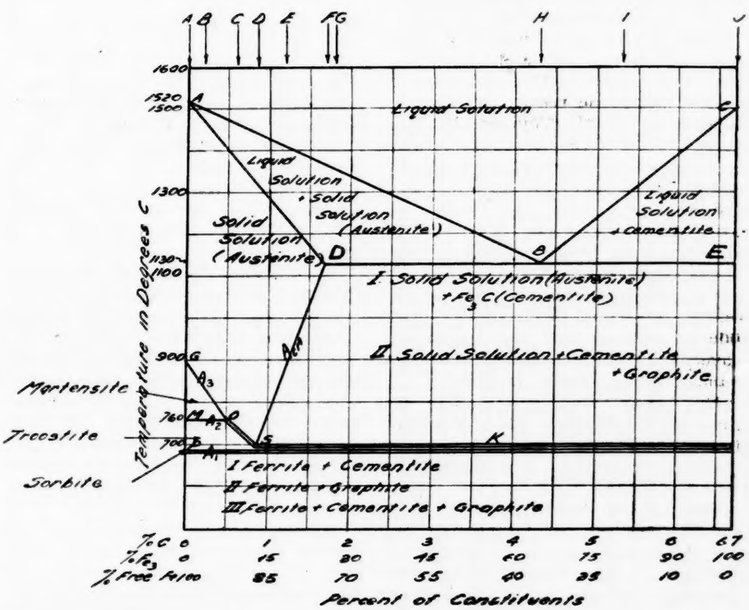
Also in the first issue of the *Journal,* R. W. Burleigh, assistant metallurgist for U. S. Ball Bearing Mfg. Co., presented an interpretation of the iron-carbon alloy diagram as it existed at that time. The diagram is reproduced below.

—30—

Advertisers in this first issue who are still going strong in the metal industry include Ludlum Steel Co. (now Allegheny Ludlum), Bell & Gossett Co., Columbia Tool Steel Co., Atlas Crucible Steel Co. (now merged with Allegheny Ludlum), Chicago Flexible Shaft Co. (now Sunbeam-Stewart Industrial Furnace Division of Sunbeam Corp.), A. Finkl & Sons Co., Leeds & Northrup Co., and Latrobe Electric Steel Co. The advertising rate was $20 per page.

—30—

The editorial page carried this slogan: "If you know it all, we need you; if you don't know it all, we can help you"—probably just as appropriate for the American Society for Metals today as it was for the American Steel Treaters Society 30 years ago.




*Iron-Carbon Diagram 30 Years Ago*

# Local Talent Tackles Toolsteel Problems


**Reported by J. J. Buczynski**
*Taylor Instrument Companies*


Meeting jointly with the American Society of Tool Engineers on Nov. 8, the Rochester Chapter A.S.M., provided a refreshing discussion on the various problems associated with the use of toolsteels. The occasion was designated "Local Talent Night", and a panel group of leading men from the Rochester area presented material on a number of subjects. This in turn was followed by considerable discussion from the floor.

A. J. Larson, Camera Works, Eastman Kodak Co., spoke on "Proper Selection of Material for Tools"; L. K. Marshall, Delco Appliance Division, General Motors Corp., presented "The Tool Designer's Metallurgical Problems"; R. V. Adair of the Gleason Works gave a summary of "Factors Which Minimize Distortion and Breakage"; while the fourth and last talk of the evening was a description of an "Unusual Fixture Design", by E. W. Moore of the Ritter Co.

W. J. Conley, of the sales department, Carpenter Steel Co., served as moderator. The topics were arranged in such a manner as to present the problems as they are met in chronological order. Greatest emphasis was placed on the fundamentals which govern the successful application of toolsteels, but many of the interesting and more specific aspects of this fascinating subject were brought out during the general discussion that ensued.

# *Lyman Is Named Associate Editor Of Metal Progress*

Appointment of Taylor Lyman as associate editor of *Metal Progress* has been announced by W. H. Eisenman, secretary of the American Society for Metals. Dr. Lyman recently completed the monumental task of organizing and editing the 1948 edition of Metals Handbook.

*T. Lyman*

In making the announcement, Mr. Eisenman pointed out that *Metal Progress* was established by the American Society for Metals in 1930 under the editorial direction of Ernest E. Thum, who brought to the work unusual experience in metallurgical engineering, editing, and technical publicity. The editor's aim for the magazine was to live up to its title; to publish information on advances in metallurgy—scientific and technical progress in the production, fabrication and use of quality metals and alloys—in common language free from mathematics, abstractions and scientific jargon.

"Editor Thum's success in this respect," said Mr. Eisenman, "may be judged by a recent citation by the Committee on Distinguished Service Awards for gathering, interpreting, and presenting information on alloy steels in all their aspects."

"The Board of Trustees of the American Society for Metals believes that the original editorial objective is still the prime reason for the existence of *Metal Progress.* In fact there is to be no pause in our efforts to maintain its unique position among American technical magazines. Hence the appointment of Dr. Lyman as associate editor. We believe that, with this team of outstanding editors, Thum and Lyman, the members of the American Society for Metals and readers of *Metal Progress* may confidently expect that the scope and coverage of the magazine will be advanced in important measure."

Dr. Lyman received his A.B. degree in Engineering from Stanford in 1940. His Master of Science in Physical Metallurgy was acquired at Harvard in 1941, with a Ph.D. (metallurgy) from Notre Dame in 1944. He was an instructor in metallurgy at Columbia, Illinois Institute of Technology and Notre Dame, with practical experience as a metallurgist at the Bendix Aviation Corp. during the latter part of the war.

# Retained Austenite May Be Associated With Upper Bainite Transformation

Reported by J. C. Selby
*Bearing Factory Metallurgical Dept. Timken Roller Bearing Co.*

Possibilities for the occurrence of retained austenite in constructional steels were discussed in detail by A. R. Troiano of Notre Dame University before the November meeting of the Canton-Massillon Chapter A.S.M. Dr. Troiano first outlined the five transformation reactions which may occur in alloy steels, illustrating them on an S-curve of S.A.E. 4340 steel. Each transformation was then explained—its mode of occurrence, the factors controlling its appearance, and how it may be recognized and studied.

One mechanism whereby austenite may be retained is the stabilization of austenite by partial upper bainite transformation. This is not as well known as some of the other methods cited—stabilization by the martensite transformation either through interrupted cooling or slow cooling through the Ms range. Interrupted and slow cooling are induced either by quenching extremely large sections or by removing the part from the quenching bath before the martensite point is reached. Finally, retained austenite may result from stabilization of the austenite by isothermal holding without decomposition of any kind.

Dr. Troiano presented some recent information to the effect that the region of the Jominy bar which contains bainitic products in most alloy constructional steels also contains retained austenite in significant amounts. He presented this as evidence that slack quenched alloy steel parts undoubtedly contain austenite in the quenched condition.

The definite possibility exists that all of this austenite will not be transformed on tempering in certain temperature ranges, and that cooling from the temper may form fresh martensite with definite adverse effects on both ductility and impact strength. Dr. Troiano emphasized that while the deleterious effects of fresh martensite are generally recognized, there is no agreement with regard to the effects of retained austenite on performance. Dr. Troiano's laboratory is engaged in work to determine the mode of the decomposition of stabilized retained austenite on tempering and the effects on mechanical properties.

## Focke Invites Audience Participation in Talk

Reported by Alexander Lesnewich
*Rensselaer Polytechnic Institute*

In keeping with his statement that "the purpose of lectures at chapter meetings is to learn more metallurgy", Arthur E. Focke, A.S.M. vice-president, explained the "Tempering of Steel" to the Eastern New York Chapter. The content of his talk has previously been reported in *Metals Review.*

Dr. Focke's highly interesting and informative lecture was unusual in the fact that his presentation utilized methods of association and repetition with audience participation to emphasize important facts and thereby aid the learning processes. A secret ballot showed that 80% of those present preferred Dr. Focke's method of presentation to the more conventional talks given at chapter meetings.

In place of the usual coffee talk, David Harker of the General Electric laboratories gave the members an additional reward with his presentation of Bragg's motion picture, "Bubble Model of a Metal."

## Improved Manufacturing Methods for Ball Bearings Narrow Tolerance Range

Reported by R. T. Stafford
*Joseph T. Ryerson & Son, Inc.*

Improvements in manufacturing methods for ball bearings during 24 years of experience in the industry were detailed by H. T. Morton, standards engineer, Fafnir Bearing Co., before the Terre Haute Chapter A.S.M. on Nov. 1. Super-precision tolerances are now expressed in millionths of an inch instead of ten-thousandths, he pointed out.

With slide illustrations, he described the steps in the manufacture of balls and components parts of bearings, most of which are made from S.A.E. 52100 steel. After forming into spheres from wire or rods, the balls are rough ground between a flat plate and flat grinding wheel rotating on parallel axes slightly offset from one another. They are hardened, drawn, finish ground and lapped to size in concentric grooved plates.

He then described various types of bearings, their applications, and precautions which should be followed to prevent premature failure. One cause of over-heating is excessive lubrication. Bearings are slushed in rust preventive compound before wrapping at the factory and need not be cleaned before installation.

Mr. Morton's talk contained an abundance of practical information for users of bearings, either in new equipment or for maintenance.

## Committee Appointed to Study Problems of Literature Classification

A committee to study the problems of metallurgical literature classification has recently been appointed under the joint sponsorship of the American Society for Metals and the Special Libraries Association. An outgrowth of a meeting on this subject held in Philadelphia during the National Metal Congress, this committee will attempt to organize a standardized classification scheme which will be adaptable to punch card filing methods. Personnel of the committee is as follows:

**Representing the American Society for Metals**

T. D. Yensen, manager, magnetic department, Westinghouse Electric Corp., chairman

A. H. Geisler, research laboratory, General Electric Co.

Frank T. Sisco, director, Alloys of Iron Research, the Engineering Foundation

Henry P. George, metallurgist, Frankford Arsenal

Marjorie R. Hyslop, editor, *Metals Review*

**Representing the Special Libraries Association**

Meredith S. Wright, librarian, research laboratories, National Carbon Co., Inc.

Robert W. Kollar, librarian, research and development division, Republic Steel Corp.

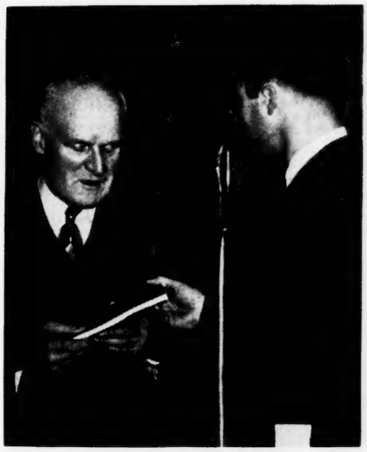
The first meeting of the committee is scheduled for the middle of January. This meeting will also be attended in an advisory capacity by Cyril Stanley Smith, director of the Institute for the Study of Metals, University of Chicago, and Taylor Lyman, associate editor, *Metal Progress.*

## Cable Opens Office as Induction Heating Consultant

J. Wesley Cable, formerly director of research and sales of the Induction Heating Corp., has opened offices as a consultant to the high frequency heating field. He will specialize in both induction and dielectric heating, and will offer complete engineering and design service to industry. His offices are at 325 East 41st St., New York 17.

Mr. Cable is a graduate of Rensselaer Polytechnic Institute, where he received the degree of electrical engineer in 1933. He was employed by Consolidated Edison Co. of New York for 8 years before joining the newly formed Induction Heating Corp. He is the author of numerous papers and articles on induction and dielectric heating, and has given many lectures before the A.S.M. and other technical societies.

## *Officers' Night Celebrated at Pittsburgh*



*Hy Walker, Long-Time Secretary of the Pittsburgh Chapter, Receives a Commemorative Edition of the Yearbook From Chairman Merrill*

Reported by C. T. Haller
*International Nickel Co., Inc.*

A.S.M. President H. K. Work was the principal speaker on Nov. 11, celebrating National Officers' Night at his home chapter in Pittsburgh. Dr. Work discussed "Recent Developments in Steelmaking Practice", with particular reference to the effect of nitrogen on strain sensitivity. A description and a colored movie of the working of an experimental four-ton openhearth illustrated how closely its operation corresponds to that of a large commercial basic openhearth furnace. M. Gensamer ably led the active discussion aroused by this presentation of a subject dear to Pittsburgh members.

Bill Eisenman was in top form and had the members roaring with stories about queer and unusual, if not supernatural, incidents on his farm. The gathering enjoyed the company of no fewer than four past presidents and one trustee, namely: E. C. Bain, J. P. Gill, M. A. Grossmann, F. B. Foley, and N. F. Tisdale.

Expressing the members' appreciation, T. W. Merrill, chairman of the Pittsburgh Chapter, presented to H. L. Walker the first copy of the new edition of the chapter yearbook. This issue was dedicated to Mr. Walker in appreciation of his 25 years of faithful service as chapter secretary.

## Steel Cartridge Cases An Example of Modern Cold Forming Proficiency

Reported by W. P. Wallace
*University of California*

"In over ten million disks received by us and made into cold drawn steel cartridge cases or mortar shells, every one would make a good part! Metallurgical defects were practically nonexistent. No lot was ever rejected for any cause." So stated Fred M. Arnold, director of research and development, Norris Stamping and Manufacturing Co., at the Oct. 28th meeting of the Los Angeles Chapter A.S.M. Similar tribute was paid to the producers of aluminum and brass used by Norris for the production of ammunition containers, cartridge cases and hundreds of other articles.

Many readers of *Metals Review* will remember that Mr. Arnold was one of the few individuals to receive a citation by the Ordnance Department for his work on steel cartridge cases.

The speaker reviewed the recent developments in cold forming of metals on large and small presses. The manufacturers of cold drawn parts, especially for the automotive industry, led the way in the development of better and larger equipment and made the demands for better and more uniform quality in sheet metals. He stressed the interdependence of press and equipment construction, tool and die design, metallurgy, and sheet metal production, for better consumer product.

Mr. Arnold discussed the roles played by presses, tooling and lubricants as well as the metallurgist in a modern sheet fabricating plant. His talk was illustrated with slides of equipment used in such a plant.

After his talk, a movie on the manufacture of containers for 5-in., 38-caliber ammunition at Norris Stamping and Manufacturing Co. was shown.

## Program Arranged for O.S.U. 75th Anniversary

In connection with Ohio State University's 75th anniversary celebration, a special program will be presented by the School of Mineral Industries of the College of Engineering on Jan. 24, 25 and 26. Five lectures will be presented during three afternoon sessions.

The Department of Metallurgy Lecture will be given on Monday afternoon at 3:15 p.m. by J. B. Austin, director of research, U. S. Steel Corp. The title of his lecture is "New Horizons in Metallurgy".

Other papers will have to do with ceramics, mining and petroleum, and the program will be concluded on Jan. 26 with a lecture by John D. Sullivan, assistant director, Battelle Memorial Institute, entitled "The Role of the Mineral Industries in the National Economy".

# Practical Problems of Machinability

*The Second Portion of Lecture III in the Series on "The Working of Steel" Written by Chester M. Inman for the Worcester Chapter A.S.M.*

IN ADDITION to the rake of the tool, which was discussed in last month's installment, a second requirement for good machinability is satisfactory tool life. It should be apparent that any means to increase tool life will automatically reflect favorably upon the machining qualities of the steel. It is important, therefore, that the manner in which a cutting tool dulls or fails be considered.

The value of a cutting tool lies in its ability to resist abrasion and heat softening. This calls for a material which will retain high hardness under the working heat produced. Proper grinding, correct side relief and rake angles of the tool, together with reasonable feeds and speeds, are much more important than the composition of the tool material. High speed toolsteel is the general-purpose steel most satisfactory for all-around use.

Experiments have shown that dulling of a high speed tool takes place in three stages: first, an initial chipping or crumbling of the cutting edge; second, gradual dulling due to abrasion; and third, abrasion and heat softening.

The first and most important stage is the initial minute chipping of the cutting edge. The next stage takes place immediately. That is, after the edge of the tool has failed, the front edge of the tool rubs on the work, causing abrasion. Friction results, heat is developed, and the tool fails rapidly.

The initial chipping and resultant dulling due to abrasion is in large part due to the quick failure of the sawteeth produced on the cutting edge by the grinding operation. This condition can be minimized by grinding with a very fine wheel; both side relief and rake angles should then be honed. Most important (but very much neglected) is to hone slightly the sharp cutting edge itself so as to eliminate the potential sawteeth ever present after grinding.

Other methods are used to delay this initial chipping action and thus increase tool life:

1. Adopt grinding practices which do not start microscopic cracks on the cutting edge or faces of the tool. High speed steel is a dense material and the common practice of cooling the tool repeatedly when grinding dry causes minute cracks on the cutting edge which rapidly fail under the cut. Less than 10% of the possible life of the tool may be realized when it is ground in this manner. Unless drastically abused, the temper of the tool will not be harmed, for a well-hardened high speed steel tool has already been heated twice in the tempering operation to approximately 1050° F. (a dull red heat) to develop the desired toughness. In grinding high speed steel, either grind wet at all times or grind dry at all times.

2. Use only sufficient side relief for the material being machined (generally not over 4 to 6°). Too great a side relief only weakens the cutting edge and promotes early chipping.

3. Do not use too large a rake angle for the hardness of the material being machined, else the strength of the tool will be affected.

4. For roughing cuts, and especially for interrupted roughing cuts, stone off the sharp cutting edge at about 30°, making a land of about one-fifth of the feed being used.

### Alleviation of Abrasion

Dulling due to abrasion (the second stage) may be alleviated in various ways:

1. Use as large a rake angle as possible; this reduces the friction by lessening the pushing action of the tool.

2. Finish the tool to the smoothest possible surface, thereby reducing friction between the tool and the chip. For finishing cuts, honing the faces constituting the cutting edge greatly lengthens the life of the tool. The more modern method of superfinishing, by producing an exceedingly smooth surface for the chips to slide over, has increased tool life an unbelievable number of times.

3. Do not use too slow a cutting speed. With a low cutting speed the pressure of the chips is applied near the edge of the tool, which causes chipping. As the speed is increased (or the thickness of the chip is increased), the pressure of the chips against the face of the tool is applied further away from the edge, because of the greater wedging action at the higher speed.

4. Use higher feeds. As feed is increased, the length of tool travel necessary to remove an equal amount of material is decreased in the same proportion. The reduced length of chip flowing over the face of the tool greatly reduces abrasion. When surface finish is relatively unimportant, it has been found that the greatest amount of material may be removed in a given time by combining a slight reduction in cutting speed (which greatly lengthens tool life) with a correspondingly larger increase in feed.

For relatively brittle and hard materials where a small rake angle is employed, tool failure is mainly caused by abrasion—a wearing away and rounding over of the cutting edge. For relatively ductile materials and no built-up edge of the tool, tool failure is partly by abrasion of the rake face close to the cutting edge. For ductile materials where a built-up edge occurs, tool failure is partly caused by abrasion of the tool edge and flank (fragments that escape become embedded in the work) and partly by the cupping or cratering of the tool face a short distance back from the cutting edge, which may ultimately result in breaking off a portion of the cutting edge.

### Heat Softening

Dulling due to heat softening of high speed steel (the third stage) can be explained by the lowering of abrasion resistance as the tool heats under work. This does not mean that there is an actual softening of the tool which is not regained at lower temperatures, but that, as a general rule, the resistance to abrasion is less the higher the working temperature of the tool. For the best tool life for finishing cuts, a proper coolant decreases this heat softening effect.

Under proper operating conditions, the use of carbide tools has greatly increased tool life and speed of machining. Low tensile strength and high brittleness are the weak spots in carbide tools. The cutting edge must be guarded at all times, and carbide tools cannot be used in planers or shapers unless lifters for the tool are employed to protect the

edge on the return stroke. Rake angles must be much smaller than for high speed steel, since the pressure lines exerted by the chip must be in line with the tool and not across the tool. Greatly increased speeds are therefore necessary to obtain good surface finish. When the rigidity of the machine and tool set-up permits such high-speed operation, very little positive rake is used and many times a negative rake gives better results. Low speed and light feeds on carbide tools (and often on cast tools such as stellite) usually result in poorer tool life than high speed steel tools will give.

However, high hardness, low coefficient of friction, and finely polished surfaces, combined with high cutting speeds, so reduce the friction that long life may be obtained from carbide tools. These factors all combine to practically eliminate the possibility of formation of a built-up edge.

### Operating Conditions

A number of other means to increase tool life have been determined by tests, mainly with lathe tools, under definite operating conditions. These findings, in their application to other operating conditions, should be considered as trends, and, used in this way, generally increase tool life. Briefly the following are of interest:

A round-nosed tool with a nose radius of ½ to 2/3 the depth of cut will take about 1/3 heavier feed than a diamond-point tool with the same depth of cut. The action of the radius will also thin the chip and tend to produce a better surface finish.

For a 60-min. tool life, the cutting speed may be increased approximately 100% as the radius of the tool nose is increased from 0 to ¼ in. Too great a radius, however, will cause the tool to chatter. The use of a radius on the nose of the tool will simplify machining of smooth fillets and help to eliminate the tool mark often left by diamond-point tools. Such tool marks are a common cause of fatigue failure of finished parts, whether heat treated or not.

For a 60-min. tool life the cutting speed may be increased about 50% as the lead angle of a side cutting tool is increased from 0 to 45°. This increase in speed with increase in lead angle is made possible by a decrease in chip thickness (although the total amount removed remains the same) and by decreased interference and crowding of the chip between the side rake and back rake of the tool. Under insufficiently rigid conditions, chatter is likely to occur with wide, thin chips for angles of 30° or over.

For a 60-min. tool life in cutting soft steel, the cutting speed can be increased approximately 2/3 as the side rake is increased from 0 to 22°.

Roughly speaking, for a tool that lasts 15 min., a reduction of 10% in the speed will double the life, and a 20% reduction will give about a 60-min. tool life.

It should be noted that these trends are valuable when used in conjunction with the fundamental trends of chip formation.

In closing, it should be apparent, that, taking into consideration the many variables connected with the machining of steel, improvement may be obtained only by practical experience, gained under actual operating conditions, in the application of the fundamental principles and trends we have endeavored to outline.

### Wire Fellowship Established

The National-Standard Co. of Niles, Mich., has established an industrial fellowship at Mellon Institute in Pittsburgh to investigate problems related to the technology of fine wire products, such as tire bead wire and strand, music wire, and aircraft and textile wires. Also to be studied are problems related to flat strip for such products as piston rings, razor blades, clock and watch springs, pen points and umbrella ribs. The fellowship is headed by Charles H. T. Wilkins, formerly metallurgist with the Copperweld Steel Co.

## Shows Value of True Stress-Strain Curves In Flow Problems

Reported by R. S. Haverberg
*AC Spark Plug Division, G.M.C.*

Theory of mechanical testing was expounded by Maxwell Gensamer, assistant to director of research, Carnegie-Illinois Steel Corp., before the members of the Saginaw Valley Chapter A.S.M. on Nov. 9.

Using the tension test as his basis, Dr. Gensamer showed the advantage of the true stress-strain curve, which is plotted by using the actual cross-section area for a given load at a specific instant; elongation is measured in increments, as compared to the nominal stress-strain curve. He correlated the true stress-strain curves by testing in compression and torsion to the true curve developed by tension testing, thereby showing the mechanical properties that can be predicted.

Dr. Gensamer's address, illustrated by slides, brought out many examples of the value of true stress-strain curves in problems of flow. He then turned to a discussion of ductility and the effect of the conditions of loading on ductility. Along this line he explained the effect of the kind of loading on the brittle temperature, or transition temperature, and discussed the importance of this effect in engineering, especially in large structures.

Since it is difficult to test large specimens, work is being conducted on small test specimens in an effort to establish correlation between small specimen test results and engineering performance.

Another interesting feature of the evening was a coffee talk presented by Wendall R. Mullison of the Dow Chemical Co. on the subject of hypnotism.

## Salt Baths Recommended For Most Heat Treatments

Reported by Knox A. Powell
*Research Engineer, Minneapolis-Moline Power Implement Co.*

Almost any heat treating operation can be done more uniformly, with less distortion and less surface defects, and faster and generally cheaper in the proper molten salt bath than in any other way, James McElgin, manager of the metal working department of E. F. Houghton & Co., told the Northwest Chapter A.S.M. on Nov. 18.

Heating for quench, elevated-temperature quenching, drawing, carburizing, and nitriding were some of the examples cited. Salt bath processing, however, requires a steady flow of work for satisfactory operation, Mr. McElgin pointed out.

The speaker presented data indicating the generally unsuspected fact that a salt bath can quench as fast as water in the upper temperature ranges. Salt bath quenching requires the use of ample submerged sprays and a means of removing heat from the bath because of the low heat capacity of the salt.

The question period brought out the fact that martemper quenching can frequently be done more cheaply, with less initial expense, and with less operating difficulty using high-temperature quenching oil than in a salt bath.

## New Materials Described In Talk on Milestones In Metals and Minerals

Reported by H. O. Nordquist
*Manager, Special Steels*
*Joseph T. Ryerson & Son, Inc.*

A paper on "Recent Milestones in Metals and Minerals", prepared by John D. Sullivan of Battelle Memorial Institute, was presented by Bruce W. Gonser, also of Battelle, before the St. Louis Chapter A.S.M. on Nov. 4. The occasion was a joint meeting with the American Society for Testing Materials.

Concrete, Dr. Gonser pointed out, is still the greatest of all materials used for general construction work, from the standpoint of tonnage used. In 1947, over 315,000,000 tons of concrete was used, as compared to 90,000,000 tons of steel.

Following a brief history of man's ability to convert minerals to useful items, the speaker turned to the new high-temperature alloys. Among these is a series of alloys which will develop tensile properties in the vicinity of 30,000 psi. at 1600° F.

The new commercially available titanium is abundant and has desirable physical characteristics from a construction and corrosion standpoint. The difficulty so far encountered in producing titanium is expected to be overcome eventually, and both volume of production and cost will be brought in line with those of other useful metals.

Although many nonmetallics such as plastics may supplant various metal items and will continue to grow both in tonnage and in variety, the speaker predicted that the metals will not suffer, because of the constant parade of new items being put on the market.

The chromium and aluminum coatings that are being used to combat corrosion and to impart heat resistance to metals were also covered. Aluminum coated sheets are comparable to galvanized sheets in almost every way, Dr. Gonser said, and predicted that in most applications longer life may be expected with the aluminum coated sheets.

## Light Alloys Becoming of Increasing Importance In Non-Aircraft Fields

Reported by James M. Loiacono
*Eclipse-Pioneer Division*
*Bendix Aviation Corp.*

Robert E. Ward, director of metallurgical laboratories for Eclipse-Pioneer Division of Bendix Aviation Corp., forcibly underscored the increasing importance of the aluminum and magnesium alloys in a talk before the New Jersey Chapter's October meeting on "Engineering and Design Using Light Metals". Non-aircraft consumption of these alloys in industrial, commercial, architectural and domestic fields continues to reflect noteworthy advances.

Aluminum and magnesium alloys offer many desirable engineering properties. These include low specific gravity, high strength-to-weight ratios compared to other structural materials, good damping properties, increased stiffness compared to steel on the weight-to-weight basis and relatively good fatigue life. The magnesium alloys have an inherent notch sensitivity which must be considered in design work in order to obtain best fatigue life.

Of the various classes of aluminum and magnesium alloys available in cast, wrought or extruded form, the ones of particular interest from the design standpoint are those which, by suitable heat treatments, can be improved to a marked degree in their over-all physical properties. Methods for corrosion protection of the light alloys were also discussed.

The newly available titanium metal qualifies as a light, corrosion resistant material, Mr. Ward stated, whose field of applicability has not been sufficiently explored at this time.

Much of the data presented by Mr. Ward were drawn from his experience with the Eclipse foundries, which were the largest single producer of magnesium castings during a large part of the war.

## Cleveland Has Officers Night

Reported by Robert T. Hook
*Assistant Metallurgist*
*Warner & Swasey Co.*

At the annual National Officers' Night meeting for the Cleveland Chapter A.S.M. on Nov. 1, H. K. Work, president of the American Society for Metals and director of research of the Jones & Laughlin Steel Corp., talked on "Some New Developments in Steelmaking".

H. P. Croft, vice-president in charge of development at the Wheeling Bronze Casting Co. and an A.S.M. national trustee, spoke on the highlights of the recent National Metal Congress. He also explained the progress of the society over the past year and talked of future plans.

## *Gives Double Feature on Steelmaking*

*Photographed in Penn State's Famed Mineral Industries Art Gallery Are (Left to Right): H. J. Read, Acting Chief, Division of Metallurgy, Pennsylvania State College; D. L. McBride of Bethlehem Steel Co., Speaker at the November Meeting; and W. J. Reagan, Associate Professor of Metallurgy, Pennsylvania State College*

Reported by F. R. Lorenz
*Pennsylvania State College*

D. L. McBride, assistant superintendent of openhearth, Johnstown Plant of Bethlehem Steel Co., was the first speaker in a series of sessions being sponsored experimentally by the Penn State Chapter A.S.M. in the interest of its undergraduate members. In the afternoon, on Nov. 9, Dr. McBride addressed almost the entire undergraduate metallurgy group on the role of metallurgy and metallurgists in openhearth steelmaking and development. Following the talk, he opened himself to a lively question-discussion period which indicated that the time spent had indeed been worthwhile.

At the evening session, the chapter heard Dr. McBride talk on steel making. Steel production, he said, is the most spectacular of all the chemical industries that use high-temperature reactions in "open" containers. He then discussed the relative merits of the electric furnace, openhearth, and bessemer methods in regard to production capacity, suitability to the product specifications, production efficiency, modern practice and control of steelmaking.

### Columbus Men at Metal Show

Well over 100 metallurgists and research engineers from Columbus attended the National Metal Congress at Philadelphia last October. Battelle Memorial Institute accounted for 90 of them, Jeffrey Mfg. Co. for 10, and Ohio State University, 6. Other companies represented included Bonney Floyd Co., Columbus Bolt and Forging Co., Krouse Testing Machine Co., Columbus Auto Parts Co.

## Tells How Use of Oxygen Increases Steel Production

Reported by J. G. Cutton
*Metallurgist, Carnegie-Illinois Steel Corp.*

The story of how steel production is increased by the use of pure oxygen was told by E. G. Hill, director of research and quality control for Wheeling Steel Corp., to the Mahoning Valley Chapter A.S.M. on Nov. 9. Dr. Hill stressed the present use of oxygen in openhearth practice.

In some grades of steel, openhearth production is materially increased by the use of oxygen, both as an aid in fuel combustion and by direct introduction to the metal bath. Considerable care must be exercised to obtain optimum results.

Oxygen at 100 psi. pressure is introduced to the metal bath through a ¾-in. pipe placed approximately 4 in. into the steel. Oxygen is dispersed rather rapidly throughout the metal bath and on the average 66,000 cu. ft. of oxygen is used in each heat of steel.

Another interesting feature of the program was the coffee talk by Dean L. A. Deesz of Youngstown College Engineering School on his experiences in Russia.

## Erosion-Corrosion Damage Traced To Two Factors

Reported by W. G. Fassnacht
*Assistant Chief Metallurgist*
*Bendix Products Division*

Any form of corrosion can be recognized and classified as belonging to one or more of eight standard types, according to Mars G. Fontana of Ohio State University, addressing the Notre Dame Chapter A.S.M. on Nov. 10.

Dr. Fontana described a machine for "erosion-corrosion" testing. Erosion-corrosion is the damage which occurs when either the corroding medium or the surface under consideration moves rapidly relative to the other. A typical example is represented by an impeller-type pump. The mechanism of this phenomenon is believed to occur through one or both of two factors:

1. Destruction of the well-known "passive skin" on the surface of the solid by erosion or friction of the corroding medium.
2. Constant replacement of the liquid layer immediately adjoining the liquid-solid interface, thus preventing the formation of a saturated liquid layer in this area which would reduce corrosion.

In any situation where damage due to corrosion is encountered, one or more of eight methods may be employed to give relief.

Dr. Fontana mentioned a new plastic material, "Teflon"—the noble metal of plastics. This material is so resistant to every form of corrosion that it is too good. At present no means of cementing it have been found.

## D. J. McAdam Not Retired

Apologies are hereby tendered to D. J. McAdam, Jr., for a statement in the November issue of *Metals Review* conveying the impression that he has retired from professional activities in the field of metallurgy. This is by no means true, since Dr. McAdam is at present actively engaged in consultation work and in various writing projects including a book. The dinner held as a finale of the Seminar on Cold Working during the National Metal Congress last October was merely intended to honor his many contributions to this field of research.

### Physics Meeting in March

The Division of Solid State Physics of the American Physical Society will hold its annual meeting in Cleveland on March 10, 11 and 12. Members should make reservations at the Hollenden Hotel, Cleveland, not later than March 1.

## Syracuse University Forms New Department Of Materials Engineering

Syracuse University has announced the formation of a department of materials engineering as a division of its College of Applied Science. This department, under the direction of B. J. Lazan, occupies a new building on the new engineering campus of the University.

Besides teaching undergraduate and graduate courses in the field of metallurgy, materials testing and applied mechanics, this department is now conducting research projects for the Army Air Forces, Office of Naval Research, and industrial concerns in the field of dynamic testing of materials, fatigue, damping, and creep. Its facilities include laboratories for metallurgical and metallographic preparation, testing, and inspection: static testing, fatigue and vibration testing, X-ray radiographic testing up to 1,000,000 volts, dynamic creep testing, damping capacity testing, and a well-equipped experimental machine shop.

Recent staff additions include F. R. Morral, formerly group leader of the Metals Trade Laboratory of American Cyanamid Corp., who has published approximately 50 papers and articles on physical metallurgy; and A. J. Yorgiadis, formerly research engineer of the Sonntag Scientific Corp., who has done considerable research in dynamic testing of materials.

## Spectrochemical Methods Of Analysis Described

Reported by H. A. Lilly
*Sales Engineer*
*Aluminum Co. of America*

"Spectrochemistry as Applied to Metallurgical Analysis" was the subject of the second fall meeting of the Birmingham Chapter A.S.M. on Nov. 2. Speaker was E. E. Creitz of the Bureau of Mines, University of Alabama.

Mr. Creitz reviewed recent advances in spectrochemical analysis and described applications of methods by Vincent and Sawyer and Bryan and Nahstoll to metallurgical analyses. He also gave possible applications of the Geiger-Muller counter method of line integration to small amounts of arsenic in cast iron.

### Certified by Air Forces

The United States Air Force has certified Sam Tour & Co., Inc., to perform radiography of material to be used in conjunction with contracts of the United States Air Forces and Bureau of Aeronautics. The X-ray laboratories are in charge of Alexander Gobus, materials engineer, who has been identified with the development of radiography for 21 years.

## *Technical Papers Invited*

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1950 *Transactions*. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the society. Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 31st National Metal Congress and Exposition to be held in Cleveland, Oct. 17 to 21, 1949. Papers that are selected for presentation at the Convention will be preprinted and manuscripts should be received at A.S.M. headquarters office not later than April 15, 1949.

### *Western Metal Show*

The Publications Committee is also receiving papers to be considered for presentation at the Western Metal Congress to be held in Los Angeles, April 11 to 15, 1949, and also for subsequent publication in *Transactions*. One of the requirements for presentation in Los Angeles is that the author present the paper in person. The closing date for receipt of manuscripts is Feb. 1.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

## Cast Iron Developments Heard at Birmingham

Reported by H. A. Lilly
*Sales Engineer, Aluminum Co. of America*

C. H. Lorig, assistant director, Battelle Memorial Institute, addressed the third fall meeting of the Birmingham Chapter A.S.M. on Dec. 7. His subject was "Recent Developments in Cast Iron".

Dr. Lorig discussed the factors affecting matrix structure, as well as the types of heat treatment given to cast irons and the effect of these heat treatments on properties. The control measures required for the production of high-quality, high-strength cast irons were stressed.

## Electron Methods Used to Study Nature of Metals

Reported by R. E. Tate
*Metallurgist, N.E.P.A. Division*
*Fairchild Engine & Airplane Corp.*

The similarities and differences in electron diffraction and electron microscopy were pointed out by R. D. Heidenreich, member of the technical staff of Bell Telephone Laboratories, addressing the November technical session of the Oak Ridge Chapter A.S.M. Speaking on "Electron Methods in Metallurgy", Mr. Heidenreich told how the diffraction and microscopy techniques complement each other in obtaining useful information.

His discussion of replica techniques on etched metal surfaces emphasized the fact that the diffraction instrument reveals the crystalline characteristics of the unaffected surface material and provides a means of identifying the material in relief seen in the replicas. The electron microscope gives evidence on the nature of the slip by revealing that the slip planes visible under the light microscope are in reality a series of parallel planes of minute thickness, each of which has suffered a small displacement. Mr. Heidenreich's most recent work on the electron microscopy of thin sections of metal has revealed some facts about the orientation of adjacent grains. Electron methods are obviously becoming a powerful tool for studying metals.

## Metal Treating Institute Elects New Officers

New officers were elected by the Metal Treating Institute at its annual meeting held in Philadelphia in October. Charles H. Hewitt of Dayton Forging and Heat Treating Co. is president, and Fred Heinzelman, Jr., Fred Heinzelman & Sons, New York City, is vice president.

New trustees are Carl G. Anderson of Anderson Steel Treating Co., Detroit; Ben Berlien, Industrial Steel Treating Co., Oakland, Calif.; Philip Keidel of Robert Wooler, Philadelphia; Roy M. Spindler, Spindler Metal Processing Co., Racine, Wis.; and John R. Wolf, Dura-Hard Steel Treating Co., Chicago.

R. G. Sault, Porter Forge & Furnace, Inc., Somerville, Mass., past president, and Paul J. Zeitz, Commercial Steel Treating Co., Cleveland, will continue to serve as trustees.

### N. Y. U. Gets Research Contract

A research contract has been awarded to the New York University College of Engineering by the Watertown Arsenal covering the development of titanium-carbon and titanium-nitrogen phase diagrams. The work will be under the direction of John P. Nielsen, associate professor of metal science.

# Recent Developments in Stainless Outlined; Speaker Takes Look at the Future

Reported by Morris Cohen
*Massachusetts Institute of Technology*

At its December meeting, Boston Chapter listened to a down-to-earth review of "Recent Developments in Stainless Steel" by Ernest E. Thum, well-known editor of *Metal Progress*. Mr. Thum hit the highlights of this interesting subject from the unique viewpoint of "a detached observer."

It was pointed out that great strides have been made in sheet mill practice, with improvement in surface quality and trend toward continuous rolling of wider sheet. Meticulous housekeeping in stainless steel plants has been one of the important factors in the reduction of defects and rejections, (and—interestingly enough—accidents to personnel).

The stabilization of austenitic stainless steel against intergranular carbide precipitation is being combatted, not only with additions of titanium and columbium as in the 321 and 347 grades, but also with lowered carbon content (0.03% or less). This is about one-half the carbon level characteristic of the other stainless grades, and is achieved by blowing oxygen through the bath in the electric furnace.

### Variations in 18-8

Many variations in composition based on 18-8 are designed to withstand special service requirements. One interesting example cited by Mr. Thum is a low-carbon grade containing 30% nickel, 20% chromium, 3% copper and 2% molybdenum; it is used for valves handling sulphuric acid. This steel is forgeable and has good ductility.

The replacement of nickel by manganese in 18-8 has not gained any headway in this country, although substitution for part of the nickel is more prevalent abroad.

In the field of petroleum refining, there is an increasing use of 7% and 9% chromium steels, instead of the standard 5% chromium grade. Additions of molybdenum are favored for inhibiting low-temperature brittleness, and silicon for enhancing oxidation resistance.

Mr. Thum then traced the development of the modern gas-turbine alloys, emphasizing the interrelationship of (*a*) properties as affected by temperature and time, (*b*) fabricating characteristics, and (*c*) availability of raw materials. He showed how the turbine bucket and diaphragm materials have been improved from a stress-rupture value (1000 hr.) of 7000 psi. at 1500° F. for a steel with 17% Cr, 12% Ni, and 2% Mo, to 10,000 psi. for a steel of 16% Cr, 25% Ni, and 6% Mo, and to 16,000 psi. for heat treatable

*Louis E. Geerts (Left), Current Chairman of the Boston Chapter, Presents the Past Chairman's Certificate to Carlton Lutts (Photo by H. L. Phillips)*

Inconel alloys. The nickel-chromium-cobalt alloys such as N155, S590 and S816, were also described.

The foregoing heat resistant alloys are forgeable. Among the more brittle, cast grades are Vitallium and the stellites, based on 60% cobalt, 30% chromium. In another class of cast alloys, one-half of the cobalt is replaced by nickel. All these compositions contain relatively high carbon compared to the forgeable alloys, and depend upon a carbide phase for their excellent stress-rupture behavior (about 20,000 psi. at 1500° F.).

Mr. Thum concluded his talk with a "look at the future", when even higher temperatures must be resisted. He visualized improvements through design, with a view to improved methods of cooling the hottest metals by cold air passages. He felt that chromium-base alloys would come in for concentrated study, as the 1500° F. test level is raised to 1600° F. In this same connection, carbon and nitrogen and many of the minor or rarer metals may become important factors as alloying elements capable of strengthening the metals by continuous precipitation during their high-temperature service.

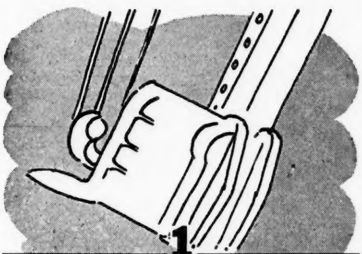
Beyond 1700° F., it appears that ceramic coatings will play an increasingly important role, and even compacts (made by powder metal methods) of refractory oxides with an infusible metal like platinum as a binder.

### To Teach at Michigan State

After 12 years as assistant director of metallurgical research at the Lunkenheimer Co., Cincinnati, Austen J. Smith has accepted a position as associate professor of metallurgical engineering at Michigan State College. Mr. Smith is a past chairman of the Cincinnati Chapter A.S.M.

# A. S. M. Review of Current Metal Literature

*An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month*



## 1 ORE BENEFICIATION

### 1a—General

**1a-40. The Cyclone; Its Use for Mineral Concentration.** F. T. C. Doughty. *Mine & Quarry Engineering,* v. 14, Nov. 1948, p. 337-340.

Principles, constructional details, and results of preliminary tests on various types of ores. Includes typical flowsheet. The cyclone is useful primarily for particle sizes below 1 mm., where heavy-media separation is not feasible.

**1a-41. The Role of Research in the Development of Labor-Saving Equipment and Methods.** E. R. Borcherdt. *Mining Congress Journal,* v. 34, Nov. 1948, p. 32-35.

Explains the scope of mining research and some of the results obtained in the field of rock drilling, including bits, drill steel, rock drills, drill rounds, and high-speed drifting. (To be concluded.)

**1a-42. The G.E.C. Mineral Dressing Laboratory.** A. E. Andrews. *Mining Magazine,* v. 79, Nov. 1948, p. 275-280.

Facilities and procedures of above laboratory (General Electric Co., Ltd., Wembley, England).

**1a-43. Advances in Milling Practice.** W. L. Zeigler. *Mining World,* v. 10, Dec. 1948, p. 32-34.

Reviews evolutionary trends.

### 1b—Ferrous

**1b-22. Reduction of Iron Ores and Agglomerates.** (In Russian.) L. M. Tsylev. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 673-680.

Attempts to solve the problem of the different reducibilities of several types of iron ore (magnetite, hematite, limonite) by partially reducing them in a hydrogen atmosphere at different temperatures and by investigating the resulting agglomerates. On the basis of microscopic investigation, five different schemes for the reduction process are proposed, depending on composition and structure of the treated ores.

**1b-23. New Ore Washing Plant at Mountain Iron Mine, Mesabi Range.** *Skillings Mining Review,* v. 37, Dec. 4, 1948, p. 1, 4, 9.

Includes flow sheet.

**1b-24. Ore-Dressing Laboratory at the United Steel Companies, Ltd.** *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 310-314.

**1b-25. Magnetic Concentration; Experiments Upon Iron Ores Used in North Lincolnshire Practice.** L. Reeve. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 509-511; discussion, p. 585-586.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 275-280. See item 1b-17, 1948.

### 1c—Nonferrous

**1c-78. The Problem of the Floatability of Zinc Blende.** (In Russian.) I. N. Plaksin, G. N. Khazhinskaya, and T. F. Brovkina. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 681-690.

Several possible ways to avoid difficulties encountered during the flotation of sphalerite. Optimum conditions of the process, including reagents used for different types of this ore. 10 ref.

**1c-79. Flotation Practice at Maude and Yellow Girl Mine, Glen Wills, Victoria. Progress Report.** *Council for Scientific and Industrial Research and University of Melbourne, Joint Investigation* No. 319, Jan. 23, 1948, 13 pages.

Results of an investigation to determine flotation characteristics of gold-bearing ore. Data on gold, sulphur, and arsenic assays and on amalgamation tests.

**1c-80. The Influence of Flotation Reagents on the Hydrometallurgical Treatment of Products of the Concentration of Ores.** (In Russian.) I. N. Plaksin and S. V. Bessonov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), June 1948, p. 883-888.

Results of an extensive study of the effect of flotation reagents on the recovery of gold in cyanidation. Application of the results to other similar problems. 12 ref.

**1c-81. A Mill Designed for Easier Operation.** Halder J. Rex. *Engineering and Mining Journal,* v. 149, Dec. 1948, p. 68-71.

New equipment and improved flowsheet of new 1500-ton concentrator.

**1c-82. North Carolina an Important Tungsten Producer.** M. H. Kline and F. K. McIntosh. *Engineering and Mining Journal,* v. 149, Dec. 1948, p. 79-81.

Includes concentration flowsneet.

**1c-83. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXVI.** Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 750-759.

Deals with titanium and its compounds. (To be continued.)

**For additional annotations indexed in other sections, see: 27b-50.**

## 2 SMELTING, REDUCTION and REFINING

### 2a—General

**2a-24. Some Industrial Uses of Nitrogen and the Rare Gases.** J. M. Crockett. *Metal Progress,* v. 54, Dec. 1948, p. 833-836.

Nitrogen, helium, and argon are being used increasingly for flushing hydrogen from liquid metals and for protective atmospheres in heat treating. In inert-gas shielded-arc welding, argon or helium is used to exclude air from the electrode, the arc, and the weld puddle.

### 2b—Ferrous

**2b-204. The Effect of Operating Conditions on Type of Reduction and Carbon Rates in the Blast Furnace.** John Taylor. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 137-176.

Calculation methods as applied to different types of ore. 14 ref.

**2b-205. The Application of Statistical Methods to the Study of Ingot Cracking.** I. M. MacKenzie and T. Urie. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 177-196.

**2b-206. A Note on the Effects of Lime Additions to Iron Ore Sinters.** J. M. McLeod. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 197-204.

Since it is believed that the poor reducibility of sinter is at least partly due to the particles of iron oxide being coated with ferrous silicate slag having little or no porosity, lime was added to cause the formation of calcium silicate instead of ferrous silicate. Results obtained were quite satisfactory, the sinters

with the higher melting calcium silicate slag having a much higher rate of reducibility.

**2b-207. Critical Analysis of the Work of Marshall and Chipman on the Problem of the Activity of Carbon and Oxygen in Liquid Steels.** (In Russian.) B. V. Stark. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 655-672.

Concludes that the experimental data of Marshall and Chipman obtained at 1540° C. concerning the carbon content in liquid steel above 1% are not sufficiently reliable. Therefore, their assumption concerning the change of activity of carbon and oxygen at an increased concentration of one of them cannot be considered valid. 6 ref.

**2b-208. Note on the Distribution of Sulphur Between Molten Iron and Slag.** Terkel Rosenqvist. *Metals Technology,* v. 15, Oct. 1948, T.N. 7, 2 pages.

Theory of the above. Believes that the diatomic molecules FeS and MnS do not exist in molten steel but that atoms and ions of sulphur and of oxygen are in equilibrium.

**2b-209. The Role of Thermochemical Factors in Basic Open Hearth Production Rate.** T. E. Brower and B. M. Larsen. *Metals Technology,* v. 15, Oct. 1948, T.P. 2451, 16 pages.

Variables which affect the net heat that must be put into the bath in order to make a heat of steel from any given set of charge materials. Heat-balance calculations; relation between proportion of hot metal or cold pig and net heat requirements; relative oxidation by air or by ore; production rate with light or heavy scrap; relation between extra feed ore and carbon at melt and production rate; effect of oxygen blowing on net heat requirement; production rate vs. charged limestone; possibilities of controlling or increasing production rate; and net heat requirement from charge to melt.

**2b-210. Some Correlations Between Variables Affecting Sulphur in Blast Furnace Iron.** T. E. Brower and B. M. Larsen. *Metals Technology,* v. 15, Oct. 1948, T.P. 2465, 13 pages.

Theoretical analysis based on statistical manipulation and evaluation of operating data from several commercial blast furnaces which include rather wide variations in practice. Concerned mainly with the effect of Mn on S elimination, but also includes certain other variables such as silicon in iron and slag basicity.

**2b-211. New Methods of Ladle De-Sulphurising Pig Iron.** (Concluded.) W. C. Newell, A. J. Langner, and J. W. Parsons. *Engineering,* v. 166, Oct. 29, 1948, p. 431-432.

Previously abstracted from *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 165-169. See item 2b-153, 1948.

**2b-212. The Acid Bessemer Process in the Manufacture of Pipe.** E. G. Price. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1337-1342.

The bottom-blown acid bessemer process in its relationship to the production of tubular products. Much of the information is also applicable to basic and side-blown converters.

**2b-213. Pressure Blast Furnaces Show Greater Production, No Special Maintenance Problems.** *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1371.

Operating results for two blast furnaces.

**2b-214. The Production of Sound Steel Ingots.** *Industrial Heating,* v. 15, Nov. 1948, p. 1936, 1938. Condensed from paper by Robert L. Stephenson.

Difficulties involved and an evaluation of the effects of some factors involved.

**2b-215. Melting Stainless Steel in an Induction Furnace.** Gordon L. Meeter. *Foundry,* v. 76, Dec. 1948, p. 97, 249.

Story of the evolution of one company's method of melting, including use of scrap metal. How analytical results and their mathematical analysis, plus close observation, made it possible to develop optimum melting practice.

**2b-216. A Spark in Steel.** *Fortune,* v. 38, Dec. 1948, p. 94-101, 174, 176, 179-182, 184, 186-188.

Use of pressure in the blast furnace. Diagrams show the evolution of the blast-furnace process over the past 100 years. Other actual or proposed developments, such as direct reduction, sponge iron, use of oxygen.

**2b-217. Softening Temperatures of Iron Ores and Agglomerates.** (In Russian.) L. M. Tsylev. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 889-898.

Studies in the blast-furnace process, including effect on slag formation. The influence of different types of ore and of slag composition on this phenomenon.

**2b-218. Wrought Iron Has Two Components.** *Industry and Power,* v. 55, Dec. 1948, p. 88-89, 114.

Chief characteristics and two present-day methods of producing wrought iron.

**2b-219. Determination of Gases in Molten Steel From the Progress of Fusion.** (In Russian.) V. T. Braga. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1052-1057.

Proposes three variations based on work published in 1947 in *Zavodskaya Laboratoriya.* This method of determination is said to open new possibilities for melt control.

**2b-220. Steel-Making by Electric Arc Furnace Process.** T. V. Simpkinson. *Canadian Metals & Metallurgical Industries,* v. 11, Nov. 1948, p. 14-17, 30. Reprinted from *Canadian Mining and Metallurgical Bulletin,* March 1948.

(To be continued.)

**2b-221. The Thermodynamics of Substances of Interest in Iron and Steel Making From 0° C. to 2400° C. I. Oxides.** F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 261-270.

Available thermal data. Free energies of formation are calculated for temperatures up to 2000° C. and the results plotted on a free-energy/temperature diagram. Equations are given for each oxide, and limits of accuracy are proposed. Advantages of graphical representation of the results and its value for explaining complex processes and equilibria. How these and other problems can be solved by use of a special transparent grid superposed on the diagram. 63 ref.

**2b-222. The Influence of Teeming Times on Ingot Surface Defects.** W. E. Goodrich. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 295-302.

Data accumulated during long-period observations made at various stages of rolling and forging operations on steel ingots. Application of the information in establishment of ideal ingot-teeming times. Variations in steel composition and quality, mold design and dimensions, and ladle-nozzle sizes. Optimum teeming times for a variety of steels and mold sizes.

**2b-223. Oxygen Enrichment; Application to Side-Blown Converter Practice.** J. L. Harrison, W. C. Newell, and A. Hartley. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 521-525; discussion, p. 589-590.

Previously abstracted from *Foundry Trade Journal,* v. 85, Aug. 19, 1948, p. 173-175. See item 2b-145, 1948.

**2b-224. Basic Bessemer Steel; Development of an Improved Quality by Nitrogen Control.** H. A. Dickie. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 525-532; discussion, p. 590-591.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 360-375. See item 2b-161.

**2b-225. Structural Steels; Various Causes of Ingot Surface Defects.** L. Reeve. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 568-571; discussion, p. 592-593.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 169-176. See item 2b-203, 1948.

**2b-226. Ingot Structures; A Series from Rimmed to Killed Steels Made from the Same Cast.** P. M. Macnair. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 572-579; discussion, p. 592.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 151-163. See item 2b-202, 1948.

**2b-227. Electric Arc Steel Making. Part II.** T. V. Simpkinson. *Canadian Metals & Metallurgical Industries,* v. 11, Dec. 1948, p. 14-17, 26-29.

The process of melting fully killed steel wherein, after suitable oxidation, the bath is deoxidized under a reducing slag. For the most part, melting of cold scrap charges is considered.

**2b-228. The Austenitic Stainless Steels —American and British Practice Compared.** F. H. Keating. *Metal Progress,* v. 54, Dec. 1948, p. 819-822.

Invites discussion as an aid to those in both countries who direct the manufacture and use of these materials. The principal points of difference in British and American practice concern the use of unstabilized compositions, the safe upper limit of carbon content in stabilized steels, and use of the Huey test for corrosion.

## 2c—Nonferrous

**2c-63. Reduction of Nickel Minerals.** *Chemical Engineering,* v. 20, Nov. 1948, p. 338, 340. Translated and condensed from "Reduction of Silicate Minerals of Nickel With Carbon Monoxide", D. P. Bogatskii, *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 20, no. 1-2, 1947, p. 81-88.

Results obtained with five Russian ores using CO for the reduction.

**2c-64. Copper Conversion.** W. H. Dennis. *Mine & Quarry Engineering,* v. 14, Nov. 1948, p. 341-344.

Process and equipment for conversion of copper matte to blister copper.

**2c-65. Effect of Gases on Tin Bronze. II.** (Concluded.) Clyde L. Frear. *Foundry,* v. 76, Dec. 1948, p. 96, 158, 160, 162.

Recommends various procedures for the prevention of shrinkage porosity.

**2c-66. Production and Properties of Nonferrous Metals.** Webster Hodge. *Metals Review,* v. 21, Nov. 1948, p. 3, 5.

Developments reported in recent literature. References to "A.S.M. Review of Current Metal Literature."

**2c-67. Belgique, berceau de la métallurgie du zinc.** (Belgium, The "Cradle"

of the Development of the Metallurgy of Zinc.) Claude Decroly. *Atomes,* v. 3, May 1948, p. 153-157.

Outlines history. The production of zinc in Belgium and the metallurgy involved.

**2c-68. Vacuum Processing; Method of Reducing Porosity in Copper Ingots.** R. A. Stauffer, K. Fox, and W. O. DiPietro. *Metal Industry,* v. 73, Nov. 12, 1948, p. 389-392. A condensation.

Previously abstracted from *Industrial and Engineering Chemistry,* v. 40, May 1948, p. 820-825. See item 2c-29, 1948.

**2c-69. A Visit to the Carteret Copper Refinery.** John V. Beall. *Mining and Metallurgy,* v. 29, Dec. 1948, p. 658-659.

Refinery practice and equipment.

## 2d—Light Metals

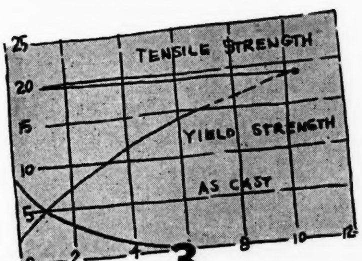
**2d-25. Technology of Aluminum and Magnesium.** Charles M. Craighead. *Metals Review,* v. 21, Nov. 1948, p. 7, 9.

Developments in production and properties. References to "A.S.M. Review of Current Metal Literature."

**2d-26. Metal Oxides; Behaviour in the Electrolytic Process for Aluminium Production.** *Metal Industry,* v. 73, Nov. 12, 1948, p. 393. Translated and condensed from article by J. W. Fischer, *Angewandte Chemie.*

Theortical aspects and experimental data relating to the behavior of a number of metal oxides either intentionally added to, or introduced as impurities into, the aluminum-reduction furnace.

**For additional annotations indexed in other sections, see: 10b-89; 27c-18.**




# 3 PROPERTIES

## 3a—General

**3a-134. Different Mechanisms of Plasticity in Metallic Alloys.** (In Russian.) A. A. Bochvar. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), May 1948, p. 649-653.

A new approach for the explanation of the mechanism of plasticity of alloys at high temperatures, emphasizing the predominant influence of the character of the interaction of the existing phases of the heterogeneous system.

**3a-135. The Creep of Metals.** E. Orowan. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 45-82, 93-96; discussion, p. 83-92.

From the viewpoint of the physicist rather than that of the engineer or metallurgist. 50 ref.

**3a-136. A Note on the $\Delta E$ Effect in Alnico.** R. Street and J. C. Woolley. *Proceedings of the Physical Society,* v. 61. Oct. 1948, p. 391-392.

Some experimental results on the change in Young's modulus of a ferromagnetic substance accompanying magnetization, known as the $\Delta E$ effect. The results indicate that Alnico rods, and possibly other high coercivity alloys, may be used advantageously in magnetostriction oscillator and filter circuits.

**3a-137. A Review of Magnetic Materials Especially for Communication Systems.** R. A. Chegwidden. *Metal Progress,* v. 54, Nov. 1948, p. 704B, 705-714.

Both the high-permeability materials and the alloys used for permanent magnets are included. A data sheet summarizes the typical properties of all the materials discussed. 19 ref.

**3a-138. The Emissivity of Iron-Tungsten and Iron-Cobalt Alloys.** Harry W. Knop, Jr. *Physical Review,* ser. 2, v. 74, Nov. 15, 1948, p. 1413-1416.

Spectral emissivity at $0.667\mu$ was determined for an 18%-W Fe alloy and a 40%-Fe Co alloy. Changes were detected at the peritectoid and peritectic reaction temperatures for W-Fe and at the $A_3$ point for Fe-Co. Emissivity changes found at 1044 and 1292° K. in Fe-Co are attributed to the order-disorder transition and the ferro to paramagnetic transformation, respectively. The resistivity of 40%-Fe Co was determined as a function of temperature.

**3a-139. Melting-Point Chart.** K. H. McPhee. *Electronics,* v. 21, Dec. 1948, p. 118.

Metals, alloys and ceramics commonly used in electron tubes are covered. Critical temperatures in °F. and C.

**3a-140. Investigation of Rate Coefficient in Different Types of States of Stress.** (In Russian.) L. D. Sokolov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, May 1948, p. 687-696.

Establishes, on the basis of experiments on compressing, stretching, rolling, drawing, pressing, and shearing, with different rates of deformation, that the dependence between the produced stresses and rates is the same for all these types of metal treatment, under the conditions of true equivalence of stresses to deformation. Data for lead, two steels, and aluminum.

**3a-141. Corresponding States of Metals.** (In Russian.) M. A. Zaikov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 847-856.

The author develops further his theory of corresponding states of materials, which permits interpretation of the properties of all metals by a single curve and a single equation. Data obtained by use of this equation. 11 ref.

**3a-142. A Theory of Strength of Metals Based on Their Structures.** (In Russian.) N. K. Spitko. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 857-862.

Assumes that the deformation of polycrystals proceeds by deformation of the individual grains. On this basis, a method for averaging of yield points is proposed and validated experimentally for three types of alpha iron, for copper, and for zinc. Influence of structural state of the material.

**3a-143. Agreement of Mechanisms of Fracture and Unit (Normal) Strengths of Metals.** (In Russian.) E. M. Shevandin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 863-874.

Critically analyzes the theories of Davidenkov, Freedman, Kuntze, and Rebinder. 14 ref.

**3a-144. Theory of Elastic-Plastic Deformation and Its Applications.** (In Russian.) A. A. Il'yushin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 769-788.

On the basis of theoretical analysis, a very general mathematical expression covering all known and several not yet fully investigated theories of solid bodies under deformation is proposed. Practical application to various states of stress.

**3a-145. Concerning Stability of Crystal Lattices.** (In Russian.) V. Zhdanov and L. Tikhonova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 18, June 1948, p. 552-558.

The stability of monoatomic cubic face-centered lattices under unilateral tensile and compressive stresses. The destruction of the lattice is shown to possess different characteristics under tension and under compression stress; that is, its resistance to compression stress is considerably less than to tension.

**3a-146. The Problem of the Influence of Rate on Resistance During Plastic Deformation.** (In Russian.) D. I. Suyarov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 921-924.

Attempts to establish a relationship. Factors affecting it. Graphs show deformation vs. applied force for a Pb-Sb alloy.

**3a-147. Studie jednoduchych podvojnych slitin s eutektikem.** (A Study of Simple Binary Alloys Containing a Eutectic.) Otto Hajicek. *Hutnické Listy* (Metallurgical Topics), v. 3, Sept. 1948, p. 265-270.

Results of an analysis of literature data which has resulted in development of a mathematical relationship among composition and melting point of the eutectic, and melting points of the individual components of simple binary alloys.

**3a-148. Thermo-Electricity; A Survey of Factors Affecting the Thermo-Electric Power of Metals.** D. Hadfield. *Iron and Steel,* v. 21, Nov. 1948, p. 478-482.

The thermoelectric effect gives a simple yet fundamental indication of the condition of metals being affected by chemical and metallographic composition, mechanical and thermal treatment, strain, and magnetization. Application to such problems as the solution of carbon in alpha iron, the nature of dislocations and grain boundaries, and transformation points. 25 ref.

**3a-149. Possibilités de remplacement de pieces de fonte malléable par des pieces en alliages légers.** (Possibility of Replacement of Malleable Cast-Iron Pieces by Light Alloys.) Gustave Caminade. *Fonderie,* v. 32, Aug. 1948, p. 1284-1285.

Comparative properties of "Tenzaloy"—an Al alloy containing 8.00% Zn, 0.80% Cu, and 0.40% Mg; of A-U5GT—an Al alloy containing 4.2 to 5.0% Cu, 0.17 to 0.35% Ti, not more than 0.35% Fe, and smaller amounts of Zn, Mn, Ni, Sn, etc.; and of several French malleable irons.

**3a-150. Study of the Thermoplastic After-Effect in Metals (Anomalous Case of Elastic After-Effect).** (In Russian.) Sh. S. Manevich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1106-1116.

Investigates, both theoretically

and experimentally, the presence of thermoplastic after-effect, consisting of a change in the value of residual deformation in specimens deformed during heat treatment. It seems that such phenomena depend not only on the chemical composition, but on their structure and mechanical properties. Data for ferrous and non-ferrous metals and alloys.

**3a-151. Methods of Investigation of Irregularly Deformed States.** (In Russian.) P. O. Pashkov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1116-1124.

Critically analyzes existing methods. A new formula based on a previously developed theory of local deformation, permitting solution of this problem. Experimental data for lead prove the validity of the formula.

## 3b—Ferrous

**3b-186. The Development of a High Creep Strength Austenitic Steel for Gas Turbines.** D. A. Oliver and G. T. Harris. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 97-119; discussion, 120-136.

Basic requirements of steels and extensive details concerning development of the British steel known as G.18B.

**3b-187. The Magnetic Properties of Sintered Iron and Iron Base Alloys.** W. Rostoker. *Metals Technology,* v. 15, Oct. 1948, T.P. 2437, 22 pages.

Shows experimentally that low-porosity alloys having good magnetic properties can be produced by diffusion-alloying of elemental powders. The technique was applied to iron, five alloys of the Fe-Si system, and three alloys each of the Fe-Ni and Fe-Co systems. It was also demonstrated that the diffusion-alloying technique can be used to produce alloys in suitable forms which are normally impossible to produce because of brittleness. The effect of porosity on magnetic properties was verified experimentally. The homogenization process was studied by an X-ray method and by development of time-temperature-property relationships. Effects of heat treatment and of nitrogen-containing atmospheres. 26 ref.

**3b-188. Fatigue Limit of S.A.E. 1095 After Various Heat Treatments.** Arthur C. Forsyth and Roland P. Carreker. *Metal Progress,* v. 54, Nov. 1948, p. 683-685.

Determined after three treatments that resulted in a hardness of Rockwell C-53: water quenched and tempered; austempered; and martempered and tempered. The fatigue limit for martempered specimens, 160,000 psi., was considerably higher than for the others, namely, 124,000 and 130,000 psi. S-N diagrams and tension-impact data.

**3b-189. Low-Temperature Impact of Annealed and Sensitized 18-8.** Erwin H. Schmidt. *Metal Progress,* v. 54, Nov. 1948, p. 698-704.

Austenitic 18-8 alloys of Types 302 and 304 (0.14 and 0.07% C, respectively) were tested in the fully annealed and sensitized conditions. Following cold deformation, Charpy keyhole notch-impact tests were made at room temperature, −150, and −300° F. Results, including those of microscopic examination. Effect of welding on sensitization.

**3b-190. Stabilization of Austenitic Stainless Steel.** *Industrial Heating,* v. 15, Nov. 1948, p. 1918, 1920, 1928. A condensation.

See abstract of complete article by Samuel J. Rosenberg and John H. Darr, *Journal of Research of the National Bureau of Standards,* v. 40, April 1948, p. 321-328, item 3b-69, 1948.

**3b-191. Field Test on Rejected Drill Pipe.** A. W. Thompson and H. G. Texter. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 252, 255-256, 259-260.

Results of field tests on strings of drill pipe made up of mill rejects. Inasmuch as only 21 failures occurred in some 46,000 ft. of drilling, none of which was even close to a mill defect, it is believed that seams, pits, scores, (inside or outside) are negligible factors even when such defects are as much as twice API allowable depth. Recommends that greater attention be paid to the care and use of drill pipe than to the question of surface defects and suggests that a hydrostatic test might be better assurance of adequate strength than measurement of surface defects.

**3b-192. Graphitic Nitralloy.** Victor O. Homerberg. *Iron Age,* v. 162, Nov. 18, 1948, p. 99-101.

An Al-Cr-Mo alloy possessing the properties of nitrided Nitralloy and the added feature of easy machinability. Its composition offers flexibility in that a range of physical properties and combined-carbon: graphitic-carbon ratios can be obtained. Metallurgical characteristics and the correlation between physical properties and microstructure.

**3b-193. Properties of Nodular Cast Iron—A Bibliography.** *Iron Age,* v. 162, Nov. 25, 1948, p. 83. From *Bulletin of the British Cast Iron Research Association,* July 1948.

Nine recent references are briefly abstracted.

**3b-194. Nodular Cast Irons** (Concluded.) H. Morrogh and J. W. Grant. *Foundry,* v. 76, Dec. 1948, p. 86-89, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248.

Previously abstracted from *Foundry Trade Journal,* v. 85, July 8, 1948, p. 27-34; July 15, 1948, p. 51-57; July 22, 1948, p. 81-86; July 29, 1948, p. 105-110. See item 3b-128, 1948.

**3b-195. Vanadium Data Sheet: Vanadium Tool Steels. Part 2.** (Concluded.) T. W. Merrill. *Vancoram Review,* v. 5, no. 4, [1948], p. 10-13.

Compositions, properties, and uses.

**3b-196. Proprieta, lavorazione e trattamento termico degli acciai rapidi.** (Properties, Cold Working, and Heat Treatment of High Speed Steels.) C. Sapegno and G. Magliano. *La Metallurgia Italiana,* v. 40, July-Aug. 1948, p. 131-141.

The basic characteristics and the influence of cold working and heat treatment on their properties. Six different steels were studied.

**3b-197. Low-Temperature Properties of 18-8 Stainless Steel.** D. J. McAdam, G. W. Geil, and Frances Jane Cromwell. *Steel Processing,* v. 34, Nov. 1948, p. 592-594. A condensation.

Previously abstracted from *American Society for Metals, Preprint* no. 20, 1948. See item 3b-148, 1948.

**3b-198. Study Wear of Diesel Rings and Cylinders.** John W. Pennington. *Industry and Power,* v. 55, Dec. 1948, p. 81-83.

Results of recent investigations on 4-cycle Diesel engines. Factors involved are direct mechanical wear, scuffing, "surface disintegration", abrasion, and corrosion. It is concluded that removal of metal must be intermittent when engine wear rate is low.

**3b-199. Low Temperature Properties of 18-8 Chromium-Nickel Steel; A Bureau of Standards Report.** *Refrigerating Engineering,* v. 56, Dec. 1948, p. 512-513.

Previously abstracted from *American Society for Metals, Preprint* no. 20, 1948. See item 3b-148, 1948.

**3b-200. Some Notes on Fatigue Failures in Aircraft Parts.** Norman E. Woldman. *Iron Age,* v. 162, Dec. 9, 1948, p. 97-101.

A number of such failures in steel aircraft parts. Probable causes.

**3b-201. Plastic Flow in Cast Iron, at Room and Elevated Temperatures, With Special Reference to Relief of Stress.** C. R. Tottle. *Foundry Trade Journal,* v. 85, Nov. 11, 1948, p. 455-460, 463.

The deformation characteristics of cast iron are shown to vary considerably with mode and speed of applications of stress. Total deformation can be increased by slow loading, or aging between successive increments of stress. Incremental stressing changes elastic into plastic deformation in remarkably short periods of time at room temperature, resulting in severely deformed cast-iron bars, normally unobtainable in routine testing. The influence of this "aging" under stress is considered as a form of stress-relief treatment. Shows that temperatures of 450 to 500° C. are necessary for high-duty unalloyed iron, and 550 to 650° C. in the case of alloy additions, where 70% relief or more is desired. Creep curves confirm the tests and enable correlation of time, temperature, and deformation to be made for several compositions and types of high-duty cast iron.

**3b-202. Crankshaft Steels. Part I. Effect of Nitriding and Composition on Fatigue Properties. Part II. Nickel-Chromium-Molybdenum and Chromium-Molybdenum-Vanadium Steels.** P. H. Frith. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 542-552.

Results of extensive investigations. Photographs show comparative angles of fracture of hollow specimens with oil holes and of solid specimens.

**3b-203. Stainless-Steel Wires; A Study of Their Magnetic Properties.** P. T. Hobson, E. S. Chatt, and W. P. Osmond. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 555-560.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 145-157. See item 3b-102, 1948.

**3b-204. The Microhardness of Carbides in Toolsteels.** L. P. Tarasov. *Metal Progress,* v. 54, Dec. 1948, p. 846-847.

In order to clarify the marked resistance to grinding of certain highly alloyed types of toolsteel, Knoop hardness of the carbide particles was measured in three steels and also determined for Alundum, in order to relate hardness of the carbide particles to that of the abrasive used in grinding. Data obtained show that the complex Cr-Fe carbides in high-C, high-Cr steel are about 50% harder than cementite. The complex vanadium carbides are more than twice as hard as cementite and are even slightly harder, on the average, than aluminum oxide. Although silicon carbide is harder than either aluminum oxide or the complex vanadium carbides, extensive experimentation has shown that optimum results can be obtained by proper choice of aluminum oxide wheels and of grinding conditions.

**3b-205. Stainless Steel—A Review of Properties.** *Welding Journal,* v. 27, Dec. 1948, p. 1056-1057. Reprinted from *Tempil° Topics,* v. 3, no. 9-10.

**3b-206. Tests of Spherical Shells in the Plastic Range.** Joseph Marin, V. L. Dutton and J. H. Faupel. *Welding Journal,* v. 27, Dec. 1948, p. 593s-607s.

Spherical shell specimens of semi-killed steel were ruptured by pressure at −25 to 80° C. Mechanical properties determined included plastic stress-strain relations, yield, ultimate and fracture strengths, and ductility. A combined state of stress was produced consisting essentially of biaxial stresses of equal magnitude. Comparison of actual with theoretical values shows that for the room-temperature test the generalized St. Venant Theory gives a good approximation to the test results. Yield, true, and nominal ultimate strengths are in best agreement with the shear theory, while nominal and true fracture strengths agree best with the stress theory.

**3b-207. Stability of Steels at Elevated Temperatures.** A. B. Wilder and J. O. Light. *Welding Journal,* v. 27, Dec. 1948, p. 607s-609s.

Previously abstracted from *American Society for Metals, Preprint* no. 36, 1948. See item 18b-137, 1948.

## 3c—Nonferrous

**3c-107. Alliages de cuivre pour conducteurs electriques.** (Copper Alloys for Electrical Conductors.) (Also in German.) Henri Bovet and Theophil Zurrer. *Pro-Metal,* v. 3, May 1948, p. 78.

The composition and physical and mechanical properties of a series of copper alloys widely used in Switzerland as conductors. Specific application of certain alloys.

**3c-108. Electrical Properties of the Intermetallic Compounds $Mg_2Sn$ and $Mg_2Pb$.** W. D. Robertson and H. H. Uhlig. *Metals Technology,* v. 15, Oct. 1948, T.P. 2468, 11 pages.

Above compounds are two of the series which magnesium forms with elements of the fourth group of the periodic system. Since there is a complete series of compounds, all possessing the same comparatively simple structure, a unique opportunity is presented to study their properties with respect to increasing atomic number of the anion from silicon and germanium, through tin and lead. The present work deals with the two lower members of this group.

**3c-109. The Effect of Grain-Size on the Damping Capacity of Alpha Brass.** K. M. Entwistle. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 97-106.

Effect in both torsional and transverse vibration was investigated. Results are in close agreement with Zener's prediction of a contribution to damping capacity in all three kinds of vibration by intercrystalline thermal currents. 13 ref.

**3c-110. Aluminum Bronze Alloys—Their Properties and Applications.** John C. Kemp. *Iron Age,* v. 162, Nov. 25, 1948, p. 76-79, 98.

**3c-111. Zink als Leiterwerkstoff** (Zinc as a Conductor.) A. Schulze. *Archiv fur Technisches Messen,* Feb. 1948, p. T48 (2 pages).

Physical and chemical properties of zinc and a Zn-Al alloy and their effect on the conductivity of these metals.

**3c-112. Properties and Applications of Low-Temperature Alloys.** Frank Charity. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 137-138, 140, 142, 144.

Alloys which melt at temperatures under 300° F. Production of rigid molds from wax patterns, repair of cracked dies, and production of finished products are among the many uses.

**3c-113. Bolted Aluminum-to-Copper Connections.** W. F. Bonwitt. *Electrical Engineering,* v. 67, Dec. 1948, p. 1190.

Condensed from "An Experimental Investigation of the Electrical Performance of Bolted Aluminum-to-Copper Connections" to be published in *AIEE Transactions,* v. 67, 1948.

Results of extensive tests in which various electroplates and other metallic coatings were applied to the copper members. Different compounds were also used between the contact surfaces, and tests were made using only the bare metals. 21 combinations were evaluated both at elevated temperatures and in a corrosive atmosphere. Main criterion of performance was electrical resistance. Results are summarized, showing completely satisfactory performance when the proper treatment had been applied.

**3c-114. The Elastic Constants of Beta-Brass.** David Lazarus. *Physical Review,* ser. 2, v. 74, Dec. 1, 1948, p. 1726-1727.

Data obtained at 25° C. They differ markedly from those obtained by W. A. Good in 1941, hence are reported together with substantiating evidence. Work of other investigators is also reviewed.

**3c-115. Le bronze au glucinium.** (Beryllium Bronzes.) (Also in German.) Marcel Etienne. *Pro-Metal,* v. 1, July 1948, p. 149-153.

Chemical compositions, physical and mechanical properties, and optium conditions of heat treatment.

**3c-116. Note sur quelques alliages d'argent a durcissement structural.** (Note Concerning Some Silver Alloys Having Hardened Structures.) Marcel Ballay and Pierre Vogt. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 254-260.

A method of hardening of silver alloys (80 to 95% Ag) consisting of addition of different elements such as Cu, Al, Zn, Ni, and Sn, and additional heat treatment. Influence of each of these constituents.

**3c-117. Alliages binaires ferromagnétiques du manganese (arseniures, azotures).** (Binary Ferromagnetic Manganese Alloys—Arsenides, Nitrides.) Charles Guillaud and Jean Wyart. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 271-276; discussion, p. 276.

The magnetic properties were investigated. Methods of production, structures and transformations.

**3c-118. The Vapor Pressures of Inorganic Substances. I. Beryllium.** Robert B. Holden, Rudolph Speiser, and Herrick L. Johnston. *Journal of the American Chemical Society,* v. 70, Nov. 1948, p. 3897-3899.

The above was measured in the range 1171 to 1552° K. by measurement of both the rate at which the metal surface evaporates into a vacuum and the rate at which saturated metal vapor effuses through an orifice. Results obtained by these methods are in good agreement.

**3c-119. Materials for Collapsible Tubes.** T. C. Du Mond. *Materials & Methods,* v. 28, Dec. 1948, p. 82-84.

Their property requirements. Aluminum has joined lead and tin as a suitable material.

## 3d—Light Metals

**3d-65. The Damping Capacity of Metals in Transverse Vibration.** K. M. Entwistle. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 81-96.

Development of a method for measurement of damping capacity at low stresses on specimens of uniform cross-section vibrating transversely in the "free-free" mode. The damping capacity of Al-rich alloys ranges between 0.0022 and 0.0035%. The discrepancy between these values and those published by Frommer and Murray for specimens in torsional vibration is explained by the existence of transverse thermal currents in the former case. Changes of damping capacity during the aging of duralumin and R.R. 56 at room temperatures, following solution treating and quenching.

**3d-66. Alpeth Cable Sheath.** R. P. Ashbaugh. *Bell Laboratories Record,* v. 26, Nov. 1948, p. 441-444.

New type of cable sheath, a composite covering of aluminum, water-resistant cements, and polyethylene developed as a substitute for lead-alloy sheaths. Tests show excellent corrosion resistance and great superiority to lead in resistance to fatigue failure.

**3d-67. The Bending Modulus of Rupture of Round Magnesium Tubing.** C. H. Mortenson. *Journal of the Aeronautical Sciences,* v. 15, Nov. 1948, p. 661-664.

Bend tests were conducted on 28 round tubes of FS-1a and Ma magnesium alloy. Each alloy covered the d/t range from 20 to 75. Results are summarized empirically, and a formula is established for the minimum value of bending strength.

**3d-68. Investigation of Resistance to Plastic Deformation at High Rate of Deformation.** (In Russian.) L. D. Sokolov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics) v. 18, May 1948, p. 697-700.

Investigated for aluminum cylinders subjected to impact at an average velocity of 10,000 mm. per sec. During evaluation of dynamic resistance, the thermal effect was taken into consideration.

**3d-69. Behaviour of Stressed Aluminium at Room Temperature.** E. A. Owen, Y. H. Liu, and D. P. Morris. *Philosophical Magazine,* ser. 7, v. 39, Nov. 1948, p. 831-845; illustrations after p. 912.

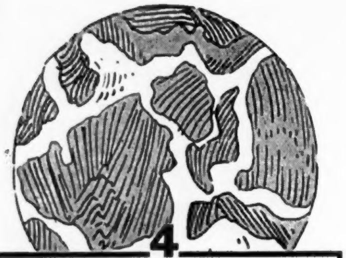
Main purpose of the work described was to study, with the aid of X-rays, the behavior of aluminum—in a state of high purity, or containing pure elements, either soluble or insoluble—after the removal of stresses. The material was mainly in plate form, but powder and powder foils were also included, as well as filed and polished surfaces.

**3d-70. Fracturing Characteristics of Aluminum-Alloy Plate.** L. J. Klingler and G. Sachs. *Journal of the Aeronautical Sciences,* v. 15, Dec. 1948, p. 731-734.

Commercial hot rolled 1½-in., 24-ST Al plate exhibited large variations in fracture stress and reduction in area for different orientations of the test specimens. These variations were attributed to mechanical anisotropy. Measurement of the fracture angles indicated the presence of a plane of weakness, but no fracture function could be found to correlate this with fracture stresses and ductilities.

**For additional annotations indexed in other sections, see:**

**2c-66; 2d-25; 4b-99; 6b-148; 22c-34; 23a-51; 24a-242; 27c-24; 27d-23.**



# CONSTITUTION and STRUCTURE

## 4a—General

**4a-55. Stable Transformation Nuclei in Solids.** John N. Hobstetter. *Metals Technology,* v. 15, Oct. 1948, T.P. 2447, 10 pages.

A reconciliation of the Becker and Borelius theories of nucleation in solids. Both the critical size and critical concentration of a stable nucleus may be found. These conditions and the free-energy threshold for nucleation were determined for a pseudo-spherical nucleus formed by concentration in a simplified binary alloy crystal of the face-centered cubic type in which elastic energy accompanying nucleation is considered negligible.

**4a-56. On the Theory of Vacancy Diffusion in Alloys.** Frederick Seitz. *Physical Review,* ser. 2, v. 74, Nov. 15, 1948, p. 1513-1523.

Above theory is discussed in an attempt to interpret the experiments of W. A. Johnson on diffusion in gold-silver alloys. It is assumed that the lattice network preserves its identity during the diffusion even though there is a resultant vacancy current passing through any region. It is also assumed that two types of atoms are present in the lattice. The theory is also employed to interpret the experiments of Smigelskas and Kirkendall concerning relative displacement during diffusion of markers placed at the interface between copper and brass. An experiment providing an absolute test for vacancy diffusion is proposed.

**4a-57. The Nature of the Temperature Minima of the Equilibrium Diagram of Binary Metallic Alloys.** (In Russian.) V. N. Svechnikov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, May 1948, p. 679-686.

Bibliographic material concerning the nature of alloys, the equilibrium diagrams of which possess temperature minima. 14 ref.

**4a-58. "Energy of Escape" of Metals.** (In Russian.) L. N. Dobretsov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 727-752.

Modern theory of bond strengths in solids. Methods for determination of these values and factors influencing them. Several original equations. 40 ref.

**4a-59. The Kinetics of Two-Phase (Eutectic) Crystallization.** (In Russian.) B. Ya Pines. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 831-842.

Presents a theoretical analysis.

**4a-60. Concerning Certain Critical States of Metals** (In Russian.) N. F. Lashko. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 986-989.

Attempts to set up a general equation representing the breakdown of the lattice structure of metals under conditions of stress or temperature (fusion). Possibility of determining certain constants of lattice stability on the basis of this equation. Constants for the more common metallic atoms.

**4a-61. Linear Atomic Chain and the Metallic State.** T. A. Hoffmann and A. Konya. *Journal of Chemical Physics,* v. 16, Dec. 1948, p. 1172-1173.

Quantum mechanical analysis is applied to some fundamental problems of metallic structures.

## 4b—Ferrous

**4b-94. The Effect of Hydrogen on the Ductility of Cast Steels.** Clarence E. Sims, George A. Moore, and Donald W. Williams. *Metals Technology,* v. 15, Oct. 1948, T.P. 2454, 26 pages.

Deals with "temporary abnormal low ductility", a type for which low-temperature aging is sufficient remedy, although no visible change in microstructure takes place. The effect of hydrogen, effect of nitrogen and of deoxidation practice, change of properties with aging, and nature of aging. 16 ref.

**4b-95. Kinetics of Grain Growth of Austenite in Medium Carbon Steels with Small Boron Contents.** (In Russian.) S. M. Vinarov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences, June 1948, p. 899-906.

Attempts to solve the controversy existing in the technical literature. Results of investigation showed that variation of the amount of boron added (0.001 to 0.010%) caused variation of the grain size of the final product.

**4b-96. Theories of Austenitic Grain-Size Control of Steel.** B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 7, Oct. 1948, p. 447-451.

A review. 25 ref.

**4b-97. A Study of Residual Gases in Cast Iron.** J. E. Hurst and R. V. Riley. *Foundry Trade Journal,* v. 85, Oct. 28, 1948, p. 407-414; Nov. 4, 1948, p. 429-432; discussion, p. 432-434.

Methods for determination; effects of storage on gas content; segregation of gases in cast iron; effects of remelting; effects of gas on microstructure and on physical and mechanical properties; and significance of gas content in production of sound castings.

**4b-98. Is Nodular Cast Iron New?** *Iron and Steel,* v. 21, Nov. 1948, p. 470-471.

Letter from George Moseley quotes from book by J. E. Johnson, "The Principles, Operation and Products of the Blast Furnace", published in 1918, to show that cast irons having nodular structures, as recently described by H. Morrogh, are not something new. Morrogh's reply attempts to show that Johnson did not obtain nodular graphite structures, but only flake and undercooled graphite structures.

**4b-99. Effects of Inclusions on the Endurance Properties of Steels.** William C. Stewart and W. Lee Williams. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 475-504.

Tests on materials rejected because of the presence of so-called "excessive" inclusions. The inclusions were classified into a few general types. Certain types and arrangements of longitudinal inclusions cause reduction of mechanical properties but small globular inclusions do not cause significant decrease in fatigue properties. The theory involved.

**4b-100. The Microstructure of Low Carbon Steel.** R. L. Rickett and F. G. Kristufek. *Steel Processing,* v. 34, Nov. 1948, p. 605-607. A condensation.

Previously abstracted from *American Society for Metals, Preprint* no. 4, 1948. See item 4b-68, 1948.

**4b-101. La fonte grise. Mécanisme de la solidification des fontes grises hypoeutectiques.** (Gray Cast Iron. The Mechanism of Solidification of Hypoeutectic Gray Cast Irons.) Henri Laplanche. *Fonderie,* v. 32, Aug. 1948, p. 1253-1270.

Results of experimental study. Method and apparatus. The influence of various factors such as graphite and silicon content and simultaneous or separate addition of manganese or phosphorus. 13 ref.

**4b-102. Sulfides in Carbon Steel.** (In Russian.) Yu. T. Lukashevich-Dubanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1038-1043.

Results of investigation showed the different shapes of such inclusions, for sulphides of different composition, and for pure sulphur.

**4b-103. Austenite Breakdown; Inter-Relation of Hardenability and Isothermal Transformation Data.** W. I. Pumphrey and F. W. Jones. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 561-564.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, June 1948, p. 137-144. See item 3b-101, 1948.

**4b-104. Retained Austenite.** Morris Cohen. *Metal Progress,* v. 54, Dec. 1948, p. 823-826. Condensed from 23rd Campbell Memorial Lecture.

Emphasizes the main facts about retained austenite, but omits the discussion of theory. The complete document will appear in v. 41, *Transactions of the American Society for Metals,* 1949.

**4b-105. Transformation of S.A.E. 4330 Steel During Continuous Cooling.** C. A. Liedholm and others. *Metal Progress,* v. 54, Dec. 1948, p. 848-B.

A partial continuous-cooling transformation diagram including 11 photomicrographs.

## 4c—Nonferrous

**4c-78. Some Factors Affecting the Rate of Grain Growth in Metals.** J. E. Burke. *Metals Technology,* v. 15, Oct. 1948, T.P. 2472, 19 pages.

Experimental work on grain growth of commercial alpha brass. Effect of partial melting at the grain boundary upon rate of grain growth, effect of sheet thickness on rate of growth and effect of penultimate anneal at high temperatures. Data on high-purity brass. Semiquantitative explanation of some of the results. 15 ref.

**4c-79. Surface Tension and Microstructure. III. The Thermal Etching of Silver.** *Metal Industry,* v. 73, Oct. 29, 1948, p. 346, 353.

## 4d—Light Metals

**4d-46. X-Ray Investigation of the Aging of Aluminum Alloys. I. Application of Monochromatic X-Rays for Structural Investigation of Aged Alloys.** (In Russian.) Yu. A. Bagaryatskii. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 827-830.

A monochromator with curved quartz prism for stable emission. X-ray patterns of the monocrystalline alloys, Al-Cu and Al-Cu-Mg, obtained with monochromatic emission.

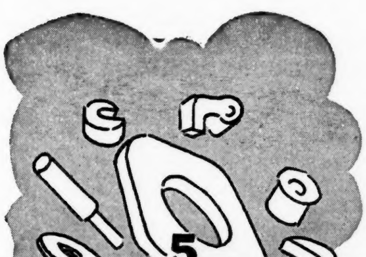
**4d-47. Deformation of Flat Aluminum Crystals.** (In Russian.) F. P. Rybalko and M. V. Yakutovich. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, July 1948, p. 915-920.

It was found that elongation by 7 to 15% produces a region having an orientation different from that of the basic crystal.

**4d-48. Inclusions in Aluminium Crystals.** W. May, T. J. Tiedema, and W. G. Burgers. *Nature,* v. 162, Nov. 6, 1948, p 740-741.

The orientation of the above pattern, using the etch method recently describe by Lacombe and Beaujardor and X-ray methods (Laue transmission photographs). It was found that pits developed by the etching reagent have orientations corresponding quite closely with the four twin possibilities. It is deduced that in order to prepare large aluminum crystals by the stress-strain method without inclusions, one has to start with fine-grained material.

**For additional annotations indexed in other sections, see:**
**3a-142; 27a-156; 27c-21.**



5

## POWDER METALLURGY

### 5a—General

**5a-66. Die-Casting Dies; The Production of Cavity Inserts From Sintered Metal Powders.** H. K. Barton. *Metal Industry,* v. 73, Oct. 29, 1948, p. 353.

Although further experimental work is needed before the process can be used commercially, the process has many attractive possibilities. Advantages and disadvantages of sintered metal-powder pressings in the die-forming field.

**5a-67. Current Trends in Powder Metallurgy.** Walter F. Toerge. *Steel,* v. 123, Nov. 22, 1948, p. 73-78, 80, 111-112, 115.

26 ref.

### 5b—Ferrous

**5b-32. Compacting of Iron Powders.** *Iron Age,* v. 162, Nov. 25, 1948, p. 96-98. Translated and condensed from article by F. Eisenkolb, *Stahl und Eisen,* v. 66/67, 1947, p. 78.

A German investigation. Influence of grain size and pretreatment of powder upon lowest possible compacting pressure, and density and strength of resulting compacts.

**5b-33. Kinetics of Sintering Compacted Iron Powder.** G. F. Huttig. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 155-158.

A thermodynamic analysis of some investigations on the sintering of iron powders, reported by Dr. Hans Bernstorff in the summer issue.

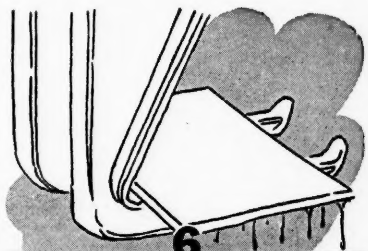
### 5c—Nonferrous

**5c-28. The Measurement of Grain-Size of Tungsten and Tungsten Carbide Powders Used for the Manufacture of Hard-Metal.** H. Burden and A. Barker. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 51-68.

Several methods were used. A sedimentation balance and a turbidimeter both proved unsatisfactory, but a gross method using a Spekker absorptiometer gave good correlation with the particle size observed with an electron microscope. The major difficulty was the effect of aggregation of particles. Results show how tungsten of four different grain-sizes behaves during processing to finished hard metal. A relationship was established between hardness of the finished metal and particle size of the original tungsten. 21 ref.

**5c-29. Porous Bronze Bearings.** J. W. Lennox and G. Brewer. *Metal Industry,* v. 73, Nov. 26, 1948, p. 429-431.

Equipment and procedures for production; and applications.



6

## CORROSION

### 6a—General

**6a-140. The Engine Performance of Lubricants.** C. G. Williams. *Institute of Petroleum Review,* v. 2, Oct. 1948, p. 306-316.

Engine deposits and corrosion.

**6a-141. Maximum Temperature of Stability of Various Alloys to Oxidizing Atmospheres.** Benjamin Lustman. *Materials & Methods,* v. 28, Nov. 1948, p. 97.

**6a-142. 13th Chem & Met Report on Materials of Construction.** *Chemical Engineering,* v. 55, Nov. 1948, p. 97-128.

For each of 17 common materials used in chemical industry, a concise summary of good, up-to-date practice in the selection of construction materials. Flow sheets show the process for production of each chemical with materials of construction of each piece of equipment identified. Corrosion-resistant materials of construction, giving trade name, manufacturer, composition or description, and most important applications.

**6a-143. Corrosion by Sulphates.** W. Z. Friend. *Chemical Engineering,* v. 55, Nov. 1948, p. 145-147.

Plant data for number of inorganic sulphates.

**6a-144. Nitric Acid Containers.** *Chemical Engineering,* v. 55, Nov. 1948, p. 265-266.

M.C.A. finds best materials are stainless Types 304 and 347 and aluminum 3S and 99.6%.

**6a-145. What Causes Corrosion of Metals?** William H. Lang. *Heating and Ventilating,* v. 45, Nov. 1948, p. 64-66.

Explanations of the various theories that have been advanced, including the findings of F. N. Speller.

**6a-146. Punched Cards for Filing Corrosion Test Results.** Lorraine R. Voigt. *Corrosion,* v. 4, Dec. 1948, p. 582-589.

Use of Keysort cards for this by International Nickel Co.

**6a-147. Corrosion.** Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 69A-70A.

Corrosion and maintenance of contact sulphuric acid plant and auxiliary equipment.

**6a-148. Polar-Type Rust Inhibitors; Theory and Properties.** H. R. Baker and W. A. Zisman. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2338-2347.

The various physical and chemical phenomena which are involved in the adsorption of polar solutes from nonpolar or weakly polar solvents. The mechanism of the rust inhibition is analyzed. Comparison of data obtained for selected polar compounds dissolved in petroleum oils, pure hydrocarbons, chlorinated hydrocarbons, aliphatic diesters, polyalkylene glycol derivatives, and silicone fluids. 30 ref.

**6a-149. Corrosion Inhibitors.** A. G. Sussex. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 159-164.

The mechanism of inhibition and the use of many of the available inhibitors, giving attention to their use in pickling. Introduction by T. P. Hoar. 28 ref.

**6a-150. Tests Show Resistance of Ni-Resist to Sea Water.** *Nickel Topics,* v. 1, Nov.-Dec. 1948, p. 2.

Results in comparison with cast iron and bronze.

**6a-151. Progres dans l'étude de l'oxydation superficielle des métaux et alliages a des températures élevées. IV. Étude au microscope électronique des pellicules d'oxyde formées sur métaux et alliages aux températures moyennes.** (Progress in the Study of the Surface Oxidation of Metals and Alloys at High Temperatures. IV. Electron-Microscopic Study of Oxide Films Formed on the Surface of Metals and Alloys at Intermediate Temperatures.) (Concluded.) Earl A. Gulbransen. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 287-300.

Photomicrographs are compared with electron-diffraction patterns for a variety of ferrous and nonferrous metals and alloys. Mechanisms of oxidation. 48 ref.

**6a-152. A Simple Form of Accelerated Atmospheric-Corrosion Test.** R. St. J. Preston. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 286-294.

A test in which specimens are subjected to corrosion in a warm humid atmosphere containing $SO_2$. Effects of temperature and concentration of $SO_2$ on rates of corrosion of bare and phosphated steel, with and without paint. A method of determining the spread of rust by measurement of light reflection and the effects of artificially damaging paint films.

**6a-153. The Use of Inhibitors for Controlling Metal Corrosion. Part I. General Principles.** G. T. Colegate. *Metallurgia,* v. 39, Nov. 1948, p. 18-20.

Types of corrosion which may occur and the various inhibitors in use.

**6a-154. Corrosion of Metals; The Influence of Micro-Organisms.** T. Howard Rogers. *Metal Industry,* v. 73, Nov. 19, 1948, p. 403-405; Nov. 26, 1948, p. 432-433. Translated from paper contributed to Les Journées sur la Corrosion des Métaux, Paris, Oct. 1947.

Some of the ways in which corrosion is caused by the influence of bacterial action. 26 ref.

### 6b—Ferrous

**6b-138. A Visual Rating System for Rusted Steel Specimens.** Harry L.

Faigen. *ASTM Bulletin,* Oct. 1948, p. 39-44.

A convenient system for rating rusted steel surfaces visually is outlined and illustrated. Numbers and letters are employed to designate stages of rusting as defined by verbal descriptions or pictorial representation in a logical and easily remembered succession of steps.

**6b-139. Intercrystalline and Other Types of Corrosion of Steam Boilers.** R. E. Coughlan, R. C. Bardwell, R. W. Chorley, B. W. DeGeer, M. A. Hanson, T. W. Hislop, Jr., H. M. Hoffmeister, Ray McBrian, Theodore Morris, S. E. Printz, R. W. Seniff, J. M. Short, R. M. Stimmel, J. E. Tiedt, and J. W. Ussher. *American Railway Engineering Association, Bulletin,* v. 50, Nov. 1948, p. 167-169.

Committee report. Use of sodium nitrate as an inhibitor is recommended. Simple device used to detect embrittlement.

**6b-140. Underground Leaks Versus Cathodic Protection.** Arthur Smith, Jr. *Chemical Engineering,* v. 55, Nov. 1948, p. 139-141.

With the case history of its own Midland plant, Dow documents its claims for cathodic protection. They figure a $12,400 investment has saved $6,500 per year.

**6b-141. The Effects of Electrolysis Upon the Strength of Reinforced Concrete.** *Engineering,* v. 166, Nov. 5, 1948, p. 453-454.

Results of experimental work on the corrosion of the steel reinforcing rods in concrete and on deteriorative effects on the concrete itself caused by stray currents from electrical machinery. (Based on work by the U. S. Bureau of Standards and by the British Electrical and Allied Industries Research Assn.)

**6b-142. Environmental pH as a Factor in Control of Anaerobic Bacterial Corrosion.** J. B. Hunter, H. F. McConomy, and R. F. Weston. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 249-250.

Effect of increase of alkalinity on growth of this type of bacteria.

**6b-143. Pipe-Line Corrosion by Sour Crude Oil.** Lyle R. Sheppard. *Oil and Gas Journal,* v. 47, Nov. 11, 1948, p. 298-300, 303, 305.

The main mechanisms of $H_2S$ corrosion of pipe lines carrying sour crude, how to detect sulphide corrosion, hydrogen-permeation effects, and the various methods for prevention of this type of corrosion. 10 ref.

**6b-144. Stress-Corrosion Cracking in Alloy-Steel Gas Cylinders.** R. C. Gifkins and W. P. Rees. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 109-122, 131.

Experimental data show importance of certain impurities in the stored gases, notably sulphur-containing compounds and hydrocyanic acid.

**6b-145. Environmental pH as a Factor in Control of Anaerobic Bacterial Corrosion.** J. B. Hunter, H. F. McConomy, and R. F. Weston. *Corrosion,* v. 4, Dec. 1948, p. 567-580; discussion, p. 580-581.

Experimental data on the effect of alkalinity on sulphate-reducing bacteria. Two problems were studied: type of action of pH 5 over 9.0 (bactericidal or bacteriostatic); and possibility of growth recurrence after exposure at high pH. The action was found to be bacteriostatic; that is, growth recurred after the pH was lowered.

**6b-146. Bearing Corrosion in Turbo-Generators.** J. A. Ten Broeke. *Corrosion,* v. 4, Dec. 1948, p. 590-596; discussion, p. 597-598.

Several cases in which stray currents and electrostatic charges caused above type of corrosion.

**6b-147. Present Day Aspects of Condensate Well Corrosion.** Harry E. Waldrip. *Corrosion,* v. 4, Dec. 1948, p. 611-617; discussion, p. 617-618.

Classification characteristics, methods of detection, costs, and methods of prevention.

**6b-148. Causes and Prevention of Drill Pipe and Tool Joint Troubles. Part 3. Drill Pipe.** H. G. Texter, R. S. Grant, and S. C. Moore. *World Oil,* v. 128, Dec. 1948, p. 100, 102, 104, 106, 108, 110, 112.

Corrosion-fatigue failure of drill pipe. It has recently been shown that salt, of relatively low concentration, is the principal cause of corrosion fatigue. Service failures and test-specimen results. $H_2$ or $H_2S$ embrittlement. (To be continued.)

**6b-149. Anodic and Cathodic Polarization Curves for Iron and Copper in Sulphate Solutions Containing Oxidizing Agents.** (In Russian.) N. D. Tomashov, G. P. Sinel'shchikova, and M. A. Vedeneeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, Aug. 1, 1948, p. 669-672.

Investigated as an aid in determination of the mechanism of corrosion of copper steels. 7 ref.

**6b-150. The Corrosion of Mild Steel by Ammonium Sulphate.** A. M. Ward. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 722-724.

Results of experiments.

**6b-151. The Atmospheric Corrosion of Iron and Steel Wires.** J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 276-285.

Results of tests on the corrosion of ferrous wires when exposed in an industrial atmosphere for periods of up to 10 yr. The rate did not vary appreciably with duration of exposure, but was greater for thin than for thick wires. Certain wrought irons and low-alloy steels proved much more resistant than mild steel. Practical applications of these observations.

**6b-152. Magnesium Anodes Extend Water Heater Tank Life.** Tom D. Fulford. *Electric Light and Power,* v. 26, Dec. 1948, p. 78-80, 82-84.

Results of laboratory and field tests which demonstrate that a magnesium anode will completely stop or markedly reduce corrosion in water-heater tanks. Installation methods.

## 6c—Nonferrous

**6c-43. Corrosion of Copper in Hydrochloric Acid.** Paul J. Gegner. *Corrosion,* v. 4, Dec. 1948, p. 619-620.

Experience in which copper cooling tubes were corroded by flushing periodically for scale removal with 16 to 20% HCl plus an inhibitor. Available information indicates that intermittent exposure to HCl up to 24% concentration should not cause excessive attack.

**6c-44. Intercrystalline Failure of Brasses and Aluminium Brasses in Air, Ammonia, and Certain Aqueous Solutions and Molten Metals.** Marjorie E. Whitaker. *Metallurgia,* v. 39, Nov. 1948, p. 21-29.

Research carried out during a period of six years. The first section consisted of an investigation of the behavior of plain brasses and brasses containing up to 4% Al in various media. Alpha, alpha-beta, and beta alloys were included, mainly in the extruded condition, but in some cases cast. The latter part of the research was concerned with the susceptibility of certain cast aluminum brasses to intercrystalline failure under conditions of stress. (To be continued.)

**6c-45. Attack on Four Heat Resisting Alloys by Various Compounds After 17 Hr. Heating in Air at 1500 F.** *Materials & Methods,* v. 28, Dec. 1948, p. 105, 107.

Qualitative effect of 60 inorganic compounds on S-816, S-890, Hastelloy B, and Haynes Stellite No. 21. Compositions of the alloys and attack of 16 of the compounds in air, $CO_2$, and helium under the same conditions otherwise.

## 6d—Light Metals

**6d-43. Magnesium Alloys: Their Corrosion Behavior.** *Magazine of Magnesium,* Nov. 1948, p. 2-5.

**6d-44. Recherches récentes sur l'aluminium de tres haute pureté.** (Recent Research on Very Pure Aluminum.) G. Chaudron. *Helvetica Chimica Acta,* v. 31, Oct. 15, 1948, p. 1553-1570.

Electrolytically purified aluminum (99.998%) was investigated in relation to passivity to HCl, preparation of the surface, kinetics of the oxidation of exposed aluminum, effects of corrosion, structure, and recrystallization. 27 ref.

**For additional annotations indexed in other sections, see: 22d-82; 23a-51; 27b-48.**


## 7a—General

**7a-238. Vacuum Deposition; Industrial Developments and Applications.** J. H. Nelson. *Metal Industry,* v. 73, Oct. 29, 1948, p. 343-345; Nov. 5, 1948, p. 369-371, 373.

Methods and applications.

**7a-239. Progress in Modern Finishing Equipment.** *Industrial Finishing,* v. 25, Nov. 1948, p. 48-50, 52, 54.

**7a-240. Production—A Quarter of a Century of Finishing.** Rollin H. Wampler. *Industrial Finishing,* v. 25, Nov. 1948, p. 66-68.

**7a-241. Electrostatic Spraying.** *Industrial Finishing,* v. 25, Nov. 1948, p. 70-72, 76.

**7a-242. Painting Products in a Custom Shop.** R. H. Sprague. *Industrial Finishing,* v. 25, Nov. 1948, p. 92-94, 96, 98, 100, 102.

Layout, equipment, and procedures.

**7a-243. Metal Coating Via "Gas Plating".** *Chemical Industries,* v. 63, Nov. 1948, p. 800.

Process being developed for deposition of metals from their volatile carbonyls. Ni, Fe, Cr, W, and Mo may be plated by the process.

**7a-244. Protective Coatings; Present-Day Practice in Combating Corrosion.**

H. Silman. *Automobile Engineer,* v. 38, Nov. 1948, p. 441-444.

Some of the outstanding problems involved in obtaining maximum durability as regards both surface protection and finish of auto-body parts. Electrodeposition, pre-painting phosphate treatments for sheet steel, and various types of organic finishes.

**7a-245. Developments in Metal Decorating Inks.** Robert J. Butler. *National Lithographer,* v. 55, Nov. 1948, p. 29.

**7a-246. The Evolution of Metal Decorating.** Clarence W. Dickinson. *National Lithographer,* v. 55, Nov. 1948, p. 30-31, 80, 82, 84, 86.

**7a-247. Metallizing as a Production Process.** Knowles B. Smith. *Welding Journal,* v. 27, Nov. 1948, p. 941-944.

Maintenance and production applications, preparation for metallizing and relative costs.

**7a-248. Flock Coating Practices.** Arthur P. Schulze. *Products Finishing,* v. 13, Nov. 1948, p. 22-26, 28, 32, 36, 38, 40, 44, 46.

Materials and coating methods.

**7a-249. Finishing Clinic.** Allen G. Gray. *Products Finishing,* v. 13, Nov. 1948, p. 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98.

Surface preparation for organic finishing; continuous carbon treatment of plating solutions, mechanism of film formation in organic coatings, and preparation of aluminum for plating.

**7a-250. Metal Cleaning.** T. C. Du Mond. *Materials & Methods,* v. 28, Nov. 1948, p. 83-94.

Metal cleaning methods and the cleaning of specific metals.

**7a-251. Preparation of Metal Surfaces Preparatory to Finishing.** V. M. Darsey. *Paint, Oil and Chemical Review,* v. 111, Nov. 11, 1948, p. 28-29.

**7a-252. New Plating Methods That Save Time, Boost Sales.** *Modern Industry,* v. 16, Nov. 15, 1948, p. 113-114, 116.

The first method is a cold-dip process for coating copper and brass with tin in a plating solution kept at room temperature, and requiring neither heat nor electrodes. The second uses a special chemical in the dipping solution to deposit a hard corrosion-resistant Ni-alloy surface on a variety of ferrous and nonferrous metals and alloys, and on graphite. The third permits mass-production electrodeposition of chromium and gold on different sections of the same metal part, using a special masking technique.

**7a-253. Simultaneous Two-Color Enameling.** *Iron Age,* v. 162, Nov. 25, 1948, p. 95.

Double spray gun for simultaneous enameling of two-color jobs.

**7a-254. Formulation of Corrosion Resistant Paint.** John W. Nee. *Corrosion,* v. 4, Dec. 1948, p. 599-610.

Properties and applications of phenolic resins, courmarone-indene resins, vinyl resins, chlorinated rubber, and specialty resins (synthetic-rubber derivatives) for such use. A few of the pigments used in formulating primers for exposure under suitable top coats in corrosive areas.

**7a-255. Diphase Metal Cleaners; Relation of Emulsion Stability to Cleaning Efficiency.** Irving Reich and Foster Dee Snell. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2333-2337.

Compares two classes of metal cleaners—the unstable emulsion type and the stable type. Metal cleaning tests and umber dispersion tests were performed. In both cases diphase cleaners were more effective than stable emulsion cleaners. Reason for this.

**7a-256. How to Select Inorganic Finishes.** Walter R. Meyer. *Steel,* v. 123, Dec. 6, 1948, p. 112-114, 142.

Various available types, including hot dip coatings, oxide and phosphate coatings, oxidized finishes produced by sulphide solutions, and electroplated coatings; and their properties and applicabilities.

**7a-257. High-Speed Rotor Tests of Paints for Under-Water Service.** F. Wormwell, T. J. Nurse, and H. C. K. Ison. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 247-260.

Apparatus for investigating the corrosion of metals immersed in liquids under conditions of rapid movement. Use of the apparatus in testing a series of typical ships' bottom compositions. Parts III and IV describe use of the apparatus in comparing several paints formulated by Fancutt and Hudson. Experimental results are given in Part V. Part VI deals with methods of evaluation of paint failure in rotor tests. 17 ref.

**7a-258. Flame-Spraying Corrosion Resistant Linings; A New Protective Technique.** H. W. Greenwood. *Industrial Chemist and Chemical Manufacturer,* v. 24, Nov. 1948, p. 743-745.

Flame spraying of Polythene.

**7a-259. Preparation of Metal Surfaces Preparatory to Finishing.** V. M. Darsey. *American Paint Journal,* v. 33, Dec. 13, 1948, p. 46, 48, 50, 52-53.

Methods of metal preparation prior to painting; factors in preparation of metal for painting; methods for determining surface cleanness; difference between phosporic acid cleaning and phosphate coating of metal; phosphate coating of steel prior to painting; preparation of zinc and its alloys for painting; and preparation of aluminum and its alloys for painting.

**7a-260. Sprayed Metal Coatings—Their Structure, Properties and Uses.** John E. Wakefield. *Metal Progress,* v. 54, Dec. 1948, p. 827-832.

New data concerning mechanical properties of carbon steels and other metals applied by the wire-gun method, and some examples of the limitations and advantages of metal spraying in production manufacturing.

## 7b—Ferrous

**7b-217. Shop Processing of Titanium Enamels Direct to Titanium Steels.** John L. Lannan. *Better Enameling,* v. 19, Nov. 1948, p. 6-7, 26-27.

Development of a satisfactory procedure, including a history of difficulties encountered and their remedies.

**7b-218. Pickle and Millroom Practice and Procedure for Application of Titanium Enamel Direct to Titanium Steel.** John C. Swartz. *Better Enameling,* v. 19, Nov. 1948, p. 12-15, 29.

**7b-219. Trouble Shootin'.** John L. McLaughlin. *Better Enameling,* v. 19, Nov. 1948, p. 17-18.

Porcelain-enameling defects: water break of ground-coat slip on dipping, dried (bisque) blisters or bubbles, and water line.

**7b-220. Setup for Surface-Treating and Painting Black Auto Horns.** Daniel P. Waits. *Industrial Finishing,* v. 25, Nov. 1948, p. 104, 106, 108, 110.

**7b-221. Pickling by Acids and by Sodium Hydride.** *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 724-731.

Reports on papers by W. F. Bews and by N. L. Evans, respectively, on these pickling methods, presented to Electrodepositors Technical Society, London, Sept. 20, 1948, Includes discussion.

**7b-222. Determination of Nickel Deposition by a Colorimetric Method as Applied to Enameling Iron.** E. A. Brown and N. H. Stolte. *Enamelist,* v. 25, Nov. 1948, p. 10-15.

Method determines the amount of Ni picked up by nickel dipping prior to application of porcelain enamel. This amount varies with the type of steel.

**7b-223. Shop Processing of Titanium Enamels Direct to Titanium Steels.** John L. Lannan. *Enamelist,* v. 25, Nov. 1948, p. 32-38.

Previously abstracted from *Better Enameling,* v. 19, Nov. 1948, p. 6-7, 26-27. See item 7b-217, 1948.

**7b-224. Pickle and Mill Room Practice and Procedure for Application of Titanium Enamel Direct to Titanium Steel.** John C. Swartz. *Enamelist,* v. 25, Nov. 1948, p. 39, 42-48.

Previously listed from *Better Enameling,* v. 19, Nov. 1948, p. 12-15, 29. See item 7b-218, 1948.

**7b-225. Application of Cover Coats Directly on Titanium Steel; Zirconium and Other Types.** M. E. McHardy. *Enamelist,* v. 25, Nov. 1948, p. 49-53.

Previously abstracted from *Finish,* v. 5, Nov. 1948, p. 39-40. See item 7b-202, 1948.

**7b-226. Special Steels and Their Preparation for Enameling.** (Excerpt.) Frank R. Porter. *Enamelist,* v. 25, Nov. 1948, p. 54-59.

Reviews the above.

**7b-227. Evaluation of Pickling Inhibitors from the Standpoint of Hydrogen Embrittlement. II. Acid Pickling of Carbon Steel.** C. A. Zapffe and M. E. Haslem. *Wire and Wire Products,* v. 23, Nov. 1948, p. 1048-1053, 1080-1082.

Pickling of mild steel in $H_2SO_4$. 15 reagents were studied, including 13 of the more widely used commercial inhibitors, one inhibitor base, and one reagent specially designed to prevent embrittlement. Seven of the reagents studied failed to prevent embrittlement regardless of concentration; four others failed to prevent embrittlement within their proprietary ranges, and four satisfactorily prevented embrittlement throughout their proprietary ranges. Of the latter four inhibitors, only the specially designed reagent represses embrittlement during pickling of stainless steel.

**7b-228. Approximate Tables to Use for Drawing-up Hot Dip Galvanizing Pot Specifications. Part III.** (Concluded.) Wallace G. Imhoff. *Industrial Gas,* v. 27, Nov. 1948, p. 10-12, 23-25.

Final installment gives examples showing how tables and graphs previously presented are used, and why the best operating results cannot be had from pots that are out of production balance.

**7b-229. Shot Blasting Replaces Pickling on Some Steel Cleaning Applications.** Kenneth Rose. *Materials & Methods,* v. 28, Nov. 1948, p. 72-75.

Methods, equipment, and applications.

**7b-230. Preventing Salt-Water Corrosion.** Thomas A. Dickinson. *Organic Finishing,* v. 9, Nov. 1948, p. 9-11.

Use of organic coating materials by the U. S. Navy.

**7b-231. Sodium Hydride Descaling of Stainless and Clad Steels.** John S. Morris. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 71-79; discussion, p. 84-86.

First of two articles on descaling of stainless steel describes and illustrates new process and equipment recently installed by Lukens Steel Co.

**7b-232. Immersion Gas Tube Process of Descaling Bar Steel.** G. D. Muschlitz. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 80-83; discussion, p. 84-86.

Second of two articles on descaling of stainless steel describes and illustrates process used at Midvale Co.

**7b-233. A Study of Primers for Ferrous Metals in an Atmospheric Exposure—Progress Report No. IV.** *Paint, Oil and Chemical Review,* v. 111, Nov. 11, 1948, p. 130-131, 133-140.

Previously abstracted from *American Paint Journal,* v. 33, Nov. 6, 1948, p. 8, 10, 26, 28, 30; Nov. 9, 1948, p. 28, 30, 32. See item 7b-214, 1948.

**7b-234. Mass Production Techniques in Plating Steel Auto Parts.** *Iron Age,* v. 162, Nov. 18, 1948, p. 106-108.

Rapid, systematized operations for polishing and plating steel auto parts.

**7b-235. A Continuous Furnace Enameling Plant for Refrigeration Products.** Gerald Eldridge Stedman. *Finish,* v. 5, Dec. 1948, p. 19-22, 54.

Porcelain-enameling operations at new International Harvester plant in Evansville.

**7b-236. Application of Cover Coat Enamel Directly to Steel.** E. H. Shands. *Finish,* v. 5, Dec. 1948, p. 25-26, 46.

Background information, an outline of experiments and production tests, and some practical suggestions.

**7b-237. Development of Porcelain Enameled Coatings on Metals for Navy Shipboard Service.** Forrest R. Nagely and Joseph H. Chilcote. *Finish,* v. 5, Dec. 1948, p. 33-35, 48, 51.

Some of the problems involved in the above for application in a variety of places, including mufflers and bulkheads. Considerable work is necessary in the fields of flame-spray equipment, application techniques, and formulations. Emphasizes need for material having the lowest practical softening point.

**7b-238. How to Prevent Defects in Porcelain Enameling Holloware. Part VIII. Blistering.** F. A. Petersen. *Ceramic Industry,* v. 51, Dec. 1948, p. 69-70.

**7b-239. Assembling and Enameling Auto Hub Caps.** Herbert Chase. *Iron Age,* v. 162, Dec. 2, 1948, p. 114-116.

Plated front and back plates are pressed into the formed part; and a conveyer system then carries the hubs through enameling lines, each handling an average of 1700 parts per hr., and drying ovens.

**7b-240. A Hydrogen Evolution Method for the Determination of the Coating Weight of Galvanized Sheets.** D. J. Swaine. *Analyst,* v. 73, Sept. 1948, p. 504-505.

Coating weight is determined by measuring the volume of hydrogen evolved by reaction with dilute HCl.

**7b-241. Sheet and Tinplate Manufacture; The Pickling Process.** (Concluded.) J. H. Mort. *Iron and Steel,* v. 21, Nov. 1948, p. 472-474.

Calculations and nomograms for acid consumption and control in sheet-mill pickling plants.

**7b-242. Porcelain Enamel for Electrically Operated Products. II.** (Concluded.) Elias Jones. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 98-103, 180, 182, 184.

Design considerations for parts to be enameled, a wide variety of applications, and properties required for each type of use. 31 ref.

**7b-243. Two Flame-Cleaning Jobs—A Study of Costs.** *Railway Engineering and Maintenance,* v. 44, Dec. 1948, p. 1283-1284.

Two identical truss bridges were flame-cleaned, one during extremely hot weather and the other in cool weather. A comparison of results revealed that the latter project was carried out at a considerably lower cost per square foot than the form-

er. Reasons for the variation in costs, and other pertinent information.

**7b-244. Automatic Spray Booth for Painting Steel Barrels.** *Compressed Air Magazine,* v. 53, Dec. 1948, p. 303.

**7b-245. Carnegie-Illinois Takes Wraps Off Newest Galvanizing Line at Irvin Works.** *Iron Age,* v. 162, Dec. 9, 1948, p. 153.

Several improvements introduced.

**7b-246. Molten Salt Bath Descaling Process Materially Reduces Production Time.** S. G. Osborne and H. R. Spence. *Steel,* v. 123, Dec. 13, 1948, p. 106, 109-110, 124, 126, 129-130, 132.

Describes Hooker process. The mixture of fused salts has the ability to change surface scale and other impurities chemically, permitting their removal in dilute acid in 0.1 to 0.01 of the usual pickling time with no measurable effect on the underlying metal. How existing baths may be converted; chemistry involved in the process itself and the quench.

## 7c—Nonferrous

**7c-40. The Action of "Chromic Acid" on Zinc Coatings.** D. J. Swaine. *ASTM Bulletin,* Oct. 1948, p. 52.

Results of the action of hot chromic acid solution on electrolytic zinc, galvanized sheet, and galvanized wire.

**7c-41. Vapor Blast for Satin Finish.** Herbert Chase. *Products Finishing,* v. 13, Nov. 1948, p. 58-60.

How blasting operation results in pleasing contrast between dull and bright areas on Chevrolet radio-grille zinc-alloy die casting.

## 7d—Light Metals

**7d-46. Priming Paints for Light Alloys.** J. G. Rigg and E. W. Skerrey. *Journal of the Institute of Metals,* v. 75, Oct. 1948, p. 69-80.

The protection afforded to aluminum and magnesium alloys by various paint primers is being investigated in rural, industrial, and marine atmospheres. Results have so far shown that iron oxide primers provide useful protection, whereas red lead primers are definitely harmful on aluminum, and especially so on magnesium. Primers pigmented with zinc chromate and zinc tetroxychromate are providing most effecient protection to light alloys.

**7d-47. Finishing Halliburton Aluminum Travel Cases.** Fred M. Burt. *Industrial Finishing,* v. 25, Nov. 1948, p. 78-80, 84, 86, 90.

Surface preparation and coating.

**7d-48. The Chemical Colouring of Aluminium.** Frank A. Allen. *Light Metals,* v. 11, Nov. 1948, p. 608-609.

Theory, practice and possibilities.

**7d-49. Metal Finishing Process Information Sheets. III. Aluminum.** George Black. *Product Engineering,* v. 19, Dec. 1948, p. 159.

Phosphoric acid anodic process; alumon process; zincate process; and "sat-n-dip" process.

**7d-50. Wax Coating Protects Street Lighting Reflectors.** Walter Skove and Anthony Nichols. *Electric Light and Power,* v. 26, Dec. 1948, p. 98, 100.

Tests under severe atmospheric conditions demonstrate that application of wax coating to polished surfaces of aluminum street-lighting reflectors permits periodic cleaning by wiping with a dry cloth to restore reflection efficiency.

**7d-51. How Glass Reflectors Are Made Through Vaporization of Aluminum.** Kenneth Rose. *Materials & Methods,* v. 28, Dec. 1948, p. 85-87.

Procedures and superior properties of such reflectors.

**For additional annotations indexed in other sections, see: 8-278; 19c-29; 20a-452; 27a-159.**

## 8 ELECTRODEPOSITION and ELECTROFINISHING

**8-259. Electroformed Moulds for Plastics and Die-Casting Dies.** *Nickel Bulletin,* v. 21, Aug-Sept. 1948, p. 109-112.

The process reviewed consists essentially of accurate machining or carving in plastics, of a master to which a high degree of finish is given. A thick shell of hard nickel

is electroformed and levelled at the back with a deposit of copper. The shell is removed from the master and given a mirror finish; after machining the back, it is mounted in a steel bolster. The main advantage lies in the relative ease of cutting, finishing, and checking a positive master as compared with a negative cavity in steel.

**8-260. Alliages legers speciaux pour le polissage electrolytique.** (Special Light Alloys for Electropolishing.) Jean Herenguel and Roger Segond. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 306-310.

Proposes two Al-Mg alloys containing 3 and 5% Mg, respectively. Their structures, properties, and optimum conditions for heat treatment and electropolishing.

**8-261. Removing Carbonate From Copper Cyanide Plating Solutions.** H. F. Ross. *Metal Progress,* v. 54, Nov. 1948, p. 687-688.

Addition of 0.6 oz. per gal. of $CaC_2$ for each oz. per gal. of carbonate produced the desired results.

**8-262. Practical Application of Modern Products.** *Products Finishing,* v. 13, Nov. 1948, p. 100-102, 104, 106, 108.

Modern zinc-plating installation and conveyerized galvanizing process.

**8-263. Cadmium Plating; Causes of Defects and Suggested Remedies.** *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 691-694.

**8-264. Control of Electroplating Solutions by Analysis and Observation. V. The Control of Cyanide Copper Solutions.** K. E. Langford. *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 695-698.

**8-265. Plastics and Plating.** *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 700-707.

Actual and potential applications of thermoplastic materials in metal-finishing plant and accessories in the light of new methods of fabrication.

**8-266. Outplating at the Verichrome Plating Co.** (Concluded.) *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 718-719, 723.

Maintenance and control and the spray shop.

**8-267. Electroplating Alloys From Cyanide Baths.** J. B. Mohler. *Iron Age,* v. 162, Nov. 25, 1948, p. 84-88.

Theory and practice of plating brass, bronze, and other alloys from the cyanide and alkaline-cyanide baths.

**8-268. Operational Formulas for Electrotinning Steel Strip.** John H. Mort. *Iron Age,* v. 162, Dec. 2, 1948, p. 104-110.

Conclusions to be drawn from development and production work and operational formulas involved. Special slide rules and nomographs, designed to speed or eliminate time-consuming calculations; methods by which calculations shortcuts can be designed for and applied to electrotinning line control.

**8-269. Composite Plated Coatings Measured Magnetically.** *Iron Age,* v. 162, Dec. 2, 1948, p. 110.

Method for measuring total thickness of Cu-Ni composite coatings on steel within about 10% and thickness of each component layer to within about 15%.

**8-270. Process Sheet for Rhodium Plating.** George Black. *American Machinist,* v. 92, Dec. 2, 1948, p. 117.

**8-271. A Process for the Electroforming of Nozzles.** John W. Andersen. *Review of Scientific Instruments,* v. 19, Nov. 1948, p. 822-823.

Rapid and accurate method for producing nozzles with specialized inside contours. The process was developed in response to a need for the production of a constant-velocity-profile nozzle for use in Bunsen flame-speed measurements and other research purposes.

**8-272. Batch Electropolishing.** J. F. Kreml. *Steel Processing,* v. 34, Nov. 1948, p. 589-591, 594.

Development of improved procedure as applied to small parts such as screws, bolts, rivets, and fish hooks of stainless steel.

**8-273. Copper Plating.** R. M. Wagner. *Plating,* v. 35, Dec. 1948, p. 1212-1215.

Historical development and current production practice in decorative plating of exterior automotive parts.

**8-274. Adhesion of Electrodeposits.** Charles L. Faust and Arthur W. Hothersall. *Plating,* v. 35, Dec. 1948, p. 1221, 1270.

Exchange of letters on the suggestion that the words "adhesive strength" be used to denote the force required to separate the coating at the interface between itself and the base metal surface. "Bond strength" should be measured by the force required to separate the plate from the base metal regardless of the place of fracture. One may have perfect adhesion with all degrees of bond strength.

**8-275. Current Reversal Devices for PR Plating in the Laboratory. A Device With Electronic Timing.** Harold J. Read and Robert W. Hall. **A Device With Mechanical Timing.** H. L. Pinkerton. *Plating,* v. 35, Dec. 1948, p. 1222-1225.

**8-276. Physical Properties of Electrodeposited Metals. I. Nickel. A Progress Report.** A. Brenner and C. W. Jennings. *Plating,* v. 35, Dec. 1948, p. 1228-1231, 1234-1239.

Great variation in the properties of electrodeposited nickel can be obtained by deposition under different conditions. Experimental procedure and compositions of plating solutions used. Variations in mechanical properties with thickness of deposit, deposition conditions, and type of bath. Effects of these factors on structure of deposits.

**8-277. Two-Tone Plating Procedures—Gold and Chrome.** *Die Castings,* v. 6, Dec. 1948, p. 48-51.

Use of masking to permit development of production-line method, applied to die-cast Zn radiator ornaments.

**8-278. Selecting Protective Finishes for Springs.** Ronald F. Pond. *Machine Design,* v. 20, Dec. 1948, p. 128-132, 194, 196.

Factors involved including appearance, protection vs. corrosion and abrasion, kind of material in the spring, surface characteristics of material to be finished, deflection required, size of springs, and proportions of springs. Emphasis is on plating, although other finishes are also mentioned.

**8-279. Electro-Plating in a Railway Shop.** T. R. Boggess. *Metal Finishing,* v. 46, Dec. 1948, p. 60-62, 77.

Equipment and miscellaneous applications in N. & W. shops, Roanoke, Va.

**8-280. Electrodeposited Zinc Coatings.** Rick Mansell. *Metal Finishing,* v. 46, Dec. 1948, p. 63-69.

Zinc plating baths; surface preparation prior to zinc plating; cyanide zinc plating; bright zinc plating; typical procedure for bright zinc plating of aircraft parts; passivation of zinc coatings; acid zinc plating; and fluoborate zinc baths.

**8-281. Chromizing Steel Surfaces—Applications.** Edward Rosen and George Black. *Metal Finishing,* v. 46, Dec. 1948, p. 70-71.

The variety of applications used successfully by the German war machine. Various parts chromized in England.

**8-282. Electrolytic Polishing of Brass Pressings.** P. Berger. *Metal Finishing,* v. 46, Dec. 1948, p. 72-77. Reprinted from *Sheet Metal Industries.*

A preliminary investigation of three processes described in the patent literature (none of which proved satisfactory) and the development of a satisfactory process. The bath developed was a mixture of phosphoric and chromic acids plus sodium dichromate. This was further improved by use of sulphuric, hydrofluoric, and propionic acids. Operating conditions, applicability, the production cycle, and control and maintenance of the bath.

**8-283. Anodizing of Aluminum Alloys.** *Metal Finishing,* v. 46, Dec. 1948, p. 83.

Outline of six methods, their advantages and disadvantages.

**8-284. Electroforming Difficult Shapes.** W. H. Prine. *Product Engineering,* v. 19, Dec. 1948, p. 86-89.

Possibilities in joining, forming dies, bonding abrasives, reproducing detail, eliminating costly machining, and making complex, accurate shapes by electrodeposition upon a shaped mandrel.

**8-285. Sur une méthode pratique de polissage électrolytique des aciers et du chrome en vue de l'examen micrographique.** (Practical Method for Electrolytic Polishing of Steel and Chromium on the Basis of Micrographic Investigations.) Pierre A. Jacquet. *Comptes Rendus,* v. 227, Sept. 13, 1948, p. 556-558.

Composition of a new electrolyte and optimum conditions of the process. Advantages claimed are low cost and long life of the electrolyte and wide temperature range of operation.

**8-286. Experiments on the Electrodeposition of Brass From Cyanide Solutions.** Tarapada Banerjee and A. J. Allmand. *Transactions of the Faraday Society,* v. 44, Oct. 1948, p. 819-833.

Results of a fundamental study. Zn-Cu alloys containing 0.98 to 99.13% Cu were deposited, and their structures examined by X-ray methods. Extensive information on the structural transformations and ranges of the various phases. 14 ref.

**8-287. Laboratory Control of Electroplating Processes.** Ronald P. Marshall. *Metallurgia,* v. 39, Nov. 1948, p. 11-12.

Close cooperation between the foreman plater and the plant chemist. A specific example for cyanide zinc solutions.

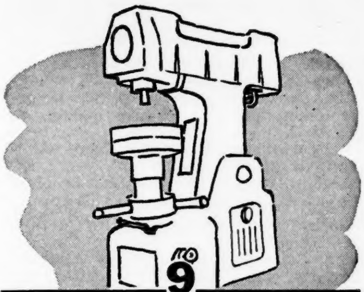
**8-288. Electroplating and Electroforming.** John G. Beach. *Metals Review,* v. 21, Dec. 1948, p. 5, 7.

Fundamental and practical advances reported in the technical literature for the past 18 months. References to "A.S.M. Review of Current Metal Literature."

**8-289. Deposition of Precious Metal Alloys. Part I. Attempts to Deposit Silver-Platinum-Gold Alloys From Alkaline Solutions.** A. K. Graham, S. Hieman, and H. L. Pinkerton. *Plating,* v. 35, Dec. 1948, p. 1217-1219.

Object of investigation was the deposition of a 60%-Ag, 20%-Au, 20%-Pt alloy on sterling silver. This first installment gives details of a number of unsuccessful attempts. Bath compositions and operating conditions. 19 ref. (To be continued.)

**For additional annotations indexed in other sections, see: 7a-252; 27a-159.**



## PHYSICAL and MECHANICAL TESTING

### 9a—General

**9a-101. Essais des matériaux dans l'industrie métallurgique.** (Testing of Materials of the Metallurgical Industry.) (Also in German.) A. Meyer. *Pro-Metal,* v. 3, May 1948, p. 68-74, 79-83.

The most important methods used in Switzerland for the determination of physical, chemical, and mechanical characteristics of finished products. A table indicating the characteristics of standard copper alloys, depending on their cold working and heat treatment. (To be continued.)

**9a-102. Strain Gage for Testing Sheet Metal at High Temperature.** Glen Guarnieri and James Miller. *Metal Progress,* v. 54, Nov. 1948, p. 692-694.

An extensometer and instrumental setup that utilizes eight strain gages, so mounted as to cancel out numerous variables and record a single equated value at any instant.

**9a-103. Two New Methods for Testing Triaxial Specimens.** Georges Welter. *Welding Journal,* v. 27, Nov. 1948, p. 529s-536s.

Mechanical and hydrostatic loading devices, methods for their use, and preliminary results obtained. Some results for steel and 17ST aluminum.

**9a-104. Significance of Proportional Limit and Yield Strength.** John L. Everhart. *Iron Age,* v. 162, Dec. 2, 1948, p. 111-113.

Mechanical limitations in accurately determining proportional limit values of many metals. Advocates use of yield strength as a more specific physical-property criterion.

**9a-105. Deformed Volume.** (In Russian.) Ya. B. Fridman and A. A. Bat. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1124-1130.

Introduction of a new three-dimensional theory for test specimens under stress instead of the commonly used two-dimensional theory. Shows that this theory gives a more accurate interpretation of mechanical-test data.

**9a-106. Micro and Macro-Deformations of Metals and Alloys Under Longitudinal Impact Loads. Part III.** Georges Welter. *Metallurgia,* v. 39, Nov. 1948, p. 13-17.

A new method and apparatus for application of either dynamic tension or compression. Presents typical data obtained for 24ST aluminum, AM57S magnesium, S.A.E.1020 steel, annealed medium-C steel, and Monel K. Superiority over those obtainable by other methods is claimed.

**9a-107. Damping Capacity.** R. F. Hanstock. *Metal Industry,* v. 73, Nov 12, 1948, p. 383-385; Nov. 19,1948, p. 411-413.

The usefulness of damping capacity measurements for investigation of the properties and constitution of metals and alloys. It is shown that these measurements are also of value in estimating the probability of fatigue failures under specified conditions.

**9a-108. Methods of Testing Creep Resistant Alloys.** Wilfred Francis Coxon. *Materials & Methods,* v. 28, Dec. 1948, p. 76-78.

Recent developments in treating and testing creep resistant alloys.

**9a-109. A Mechanical Test for Detecting Longitudinal Fissures in Fine Wire.** D. W. White. *Metal Progress,* v. 54, Dec. 1948, p. 837-841.

Test, designated as the "knife-edge" test, determines the ability of a wire to withstand tension over a relatively sharp knife edge of known radius of curvature while being rotated about its longitudinal axis. Straining the specimen in this way will cause fracture of a wire having flaws. The test is being used for quality-control inspection of semifinished tungsten wire for lamp filaments. Possible application to other kinds of wire.

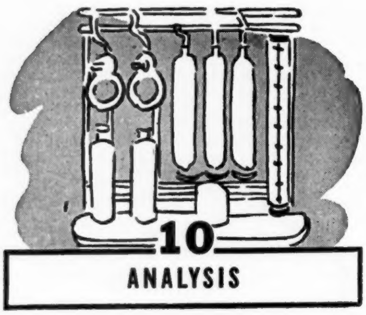
### 9b—Ferrous

**9b-58. Cold Brittleness of Steel Under Compressive Stress.** (In Russian.) D. M. Zagorodskikh. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 843-846.

A specially developed test apparatus; and a method for mathematical analysis of the experimental data. As an example, data for low-carbon steel are presented.

**9b-59. Gray Iron Transverse Test Bars.** Jack H. Schaum. *Foundry,* v. 76, Dec. 1948, p. 68-71, 216.

Common defects found in commercial transverse test bars and techniques developed at the Naval Research Laboratory for improving the casting and testing of such bars. 10 ref. (To be concluded.)




## 10a—General

**10a-106. L'importance des réactifs organiques dans le développement moderne de la chimie analytique.** (The Importance of Organic Reagents in the Modern Development of Analytical Chemistry). Paul E. Wenger. *Bulletin de la Société Chimique de France,* July-Aug. 1948, p. 721-725.

Organic reagents used in determination of copper nickel, aluminum, zirconium. iron, silver and cobalt. Principles for choosing the proper reagent.

**10a-107. Etude critique des réactions des cations.** (Critical Study of Some Cationic Reactions.) **I. Nickel.** Simonne Peltier, Thérese Duval, and Clément Duval. **II Cobalt. (Mme)** Raymonde Duval and Clément Duval. **III. Rhenium.** Clément Duval. **IV. Uranium.** Thérese Duval and Clément Duval. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 301-315.

A critical study of the various spot-test analytical reactions for the above cations proposed during 1937-1947. 101 ref.

**10a-108. A Colorimetric Determination of Thorium.** (In English.) B. F. Rider and M. G. Mellon. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 370-376.

Method based upon the precipitation of thorium oxalate and the subsequent reaction of the excess unprecipitated oxalate ions with permanganate.

**10a-109. Notes on Masking of Molybdenum. Tungsten, and Vanadium Reactions by Fluoride.** (In English.) F. Feigl. *Analytica Chimica Acta.* v. 2, Sept. 1948, p. 397-401.

It was found that in solutions containing acids and fluoride ions, the precipitation and color reactions of molybdate, tungstate, and largely those of vanadate ions, do not occur. "Demasking" is possible by addition of boric acid.

**10a-110. Diaminobenzidine as a Reagent for Vanadium and Selenium.** (In English.) J. Hoste. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 402-408.

Results of an investigation of diaminobenzidine as a qualitative spot-test reagent. Action of 54 ions vs. this reagent.

**10a-111. Notes on Analytical Procedures. V. Analysis of Pyrites.** (In English.) H. A. J. Pieters. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 411-416.

Recommended procedures for the analysis of pyrites and results of control analyses.

**10a-112. Iodine Monochloride End Point in Titration of Tripositive Antimony; Titration With Iodate, Permanganate, and Ceric Solutions.** Edward W. Hammock, Rupert A. Brown, and Ernest H. Swift. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1048-1050.

**10a-113. Separation and Microdetermination of Small Amounts of Aluminum.** Thomas D. Parks and Louis Lykken. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1102-1106.

Aluminum is separated from large amounts of common interfering metals by sodium carbonate fusion. It is then accurately and rapidly determined by polarographic, colorimetric, or ultra-violet-absorption means. 16 ref.

**10a-114. Metallo-Organic Precipitates in Inorganic Analysis; Investigation by Electron Microscopy.** Robert B. Fischer and Stanley H. Simonsen. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1107-1109.

The Ni, Pd, and Bi derivatives of dimethylglyoxime were systematically investigated to determine the effects of concentration of test solution, method of precipitation, and presence of foreign ions. Useful information of value in determining the optimum procedure to be followed in analysis was thus obtained.

**10a-115. Spectrophotometric Determination of Aluminum With Eriochromecyanine.** W. E. Thrun. *Analytical Chemistry,* v. 20, Nov. 20, Nov. 1948, p. 1117-1118.

Details of reagent preparation, procedure, and precision.

**10a-116. Multiple Dropping Mercury Electrodes.** Clark E. Bricker and N. H. Furman. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1123.

Authors' experiences indicate that multiple electrodes may cause irregular fluctuations in current at the tops of polarographic waves, making it difficult or impossible to estimate wave heights accurately.

**10a-117. A Colorimetric Method for Determining Nickel Concentration in Nickel Dip Tanks.** R. C. Willey. *Enamelist,* v. 25, Nov. 1948, p. 16-17.

Includes calibration curve.

**10a-118. Control by Invisible Light.** *Fortune,* v. 38, Dec. 1948, p. 133-135.

Principles and uses of spectrochemical analysis by industry.

**10a-119. Nature of the Minimum Current During Discharge of Tin Ions.** (In Russian.) M. Loshkarev and A. Kryukova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, July 1948, p. 805-813.

Results of a study of current variations during precipitation of tin by use of the dropping-mercury electrode, using phenols, diphenylamine, and gelatins as additives. 17 ref.

**10a-120. Influence of Concentration of Surface-Active Substances on the Maximum Current During Cathodic Deposition of Tin.** (In Russian.) M. Loshkarev and A. Kryukova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, July 1948, p. 815-822.

Influence of concentration of phenols, diphenylamine, and phenol and cresol sulphonic acids on the process of cathodic deposition of tin from sulphuric acid solutions.

**10a-121. Application of Radioactive Indicators in Analytical Chemistry.** (In Russian.) N. N. Syvorov. *Uspekhi Khimii.* (Progress in Chemistry), v. 17, July-Aug. 1948, p. 401-431.

Surveys the entire field, including applications to qualitative and quantitative determinations using both chemical and physical means. 340 ref.

**10a-122. Thioglycollic Acid as an Inhibitor for Iron in the Colorimetric Determination of Aluminium by Means of "Aluminon".** E. M. Chenery. *Analyst,* v. 73, Sept. 1948, p. 501-502.

Recommended procedure.

**10a-123. An Improved Apparatus for Rapid Electrodeposition.** F. T. Rabbitts. *Canadian Chemistry and Process Industries,* v. 32, Nov. 1948, p. 1023-1025.

Previously abstracted from *Analytical Chemistry,* v. 20, Feb. 17, 1948, p. 181-182. See item 10a-28, 1948.

**10a-124. Influence of Foreign Ions on Colorimetric Determination of Metals.** (In Russian.) A. K. Babko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1028-1037.

Various methods were studied. Advantages and disadvantages of each; and particular applications. 22 ref.

**10a-125. Quantitative Spectral Analysis of the Basic Components of Bauxite.** (In Russian.) M. M. Kler and M. I. Rezvova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1092-1094.

Method is characterized by the fact that the sample is ground into a homogeneous mass and pressed into a test specimen which is analyzed using a condensed spark.

**10a-126. Spectrographic Determination of Chromium in Ferrochrome.** (In Russian.) A. V. Kozlova and P. D. Korzh. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1095-1097.

Method for determination of chrominum in large concentration (40 to 90%). Comparative data for the spectrographic and for chemical methods.

**10a-127. Determination of Molybdenum in Ferromolybdenum by Titration With Methylene Blue.** (In Russian.) P. Ya. Yakovlev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1132-1133.

A simple and rapid method which does not require precipitation of Fe.

## 10b—Ferrous

**10b-79. Applications of Emission Spectrography in Ferrous Analysis.** S. D. Steele. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 6-28; discussion p. 29-44.

The assistance offered by these methods in metallurgical problems. 15 ref.

**10b-80. The Colorimetric Determination of Nickel, Chromium, and Manganese in Steel.** (In English.) H. A. J. Pieters, W. J. Hanssen, and J. J. Geurts. *Analytica Chimica Acta,* v. 2, Sept. 1948, p. 377-396.

With the aid of the Spekker absorptiometer the colorimetric determinations of nickel (with dimethylglyoxime), chromium (with diphenylcarbazide) and manganese (after oxidation with periodate) in steel were critically surveyed. Recommended procedures. 13 ref.

**10b-81. Ferrous Metallurgical Analysis Techniques and Their Choice.** E. C. Pigott. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 123-131.

The various methods. Tables showing the relationships and characteristics of the various quantitative and semi-quantitative techniques. Economic factors. The electronic phenomena involved in the various methods are emphasized and used as a basis for classification. 16 ref.

**10b-82. Spectroscope Used to Identify Stainless Grades.** *Steel Processing,* v. 34, Nov. 1948, p. 598-599.

**10b-83. Etude du dosage de faibles quantités de chrome dans les fontes.** (Study of the Determination of Small Quantities of Chromium in Cast Iron.) P. Gaillard and F. Gayte. *Revue de*

*Métallurgie* v. 45, Aug. 1948, p. 249-253.
Critically analyzes three volumetric methods. Advantages and disadvantages of each.

**10b-84. Photocolorimetric Method of Analysis of Non-Metallic Inclusions in Carbon Steels.** (In Russian.) N. F. Leve and S. S. Sandmirskaya. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1043-1051.
Proposes a new method characterized by high accuracy, rapidity, and low reagent cost. Analyses of four different types of steel, showing advantages of the method. 12 ref.

**10b-85. Qualitative Determination of Copper in Steels by Means of Colorimetric Titration Using Dithizone.** (In Russian.) I. B. Suprunovich and A. B. Konovalova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1061-1063.
Details of method characterized by the noninterference of Ni and Co. Typical analyses. Time of determination is 25 to 30 min.

**10b-86. Accelerating the Analysis of Cast Iron During the Blast-Furnace Process.** (In Russian.) A. G. Bogdanchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1064-1069.
A new method for sampling of cast iron during its melting in the blast furnace. A special mold for such sampling. Experimental investigation indicates applicability on an industrial scale.

**10b-87. Determination of Molybdenum in High-Chromium Steels.** (In Russian.) E. I. Grenberg and M. O. Ashkinazi. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1133.
Modifications of the photo-electric method of Davidov and Maltsev permitting determination of Mo in steels containing up to 13% Cr.

**10b-88. The Determination of Chromium in Iron and Steel.** *Metallurgia,* v. 39, Nov. 1948, p. 41-45.
A method of analysis based on silver nitrate-ammonium persulphate catalytic oxidation, previously tested for steels of low-Cr content, was further investigated in order to extend its application to a wide variety of Cr-alloy steels. The principle is valid for all Cr contents; and a procedure is described which is applicable to all classes of Cr steel.

**10b-89. Slag Basicity; Methods of Rapid Estimation.** W. A. Smith, J. Monaghan, and W. Hay. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 579-583; discussion, p. 595.
Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 121-130. See item 10b-76, 1948.

## 10c—Nonferrous

**10c-93. Le dosage electrolytique du thallium.** (Electrolytic Determination of Thallium.) M. J. Besson. *Bulletin de la Société Chimique de France,* July-Aug. 1948, p. 739.
A short critical note.

**10c-94. Filter Paper Pellets in the Spectrochemical Analysis of Solutions.** N. S. Bayliss and D. J. David. *Journal of the Society of Chemical Industry,* v. 67, Sept. 1948, p. 357-358.
Use of pellets of compressed filter-paper pulp as a supporting medium for solutions in spectrochemical analysis for graphite and copper-arc methods. The sensitivity and reproducibility of the method for B, Cu, Mn, Mo, Na, and Pb.

**10c-95. Spectrophotometric Determination of Dichromates in Saturated Solutions of Chromates and Dichromates.** Eric W. Martin, A. Norman Hixson, and Wallace M. McNabb. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1043-1045.
Method which was developed for use in connection with a process for the recovery of soluble chromates from ores. 11 ref.

**10c-96. Chemistry of Thorium; Quantitative Estimation of Thorium by a Titrimetric Iodate Procedure.** Therald Moeller and Nancy Downs Fritz. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1055-1058.
Although lacking in absolute accuracy, the procedure gives results comparable with those obtained by accepted procedures and is much more rapid.

**10c-97. Colorimetric Determination of Gold as Bromoaurate; Separation of Small Amounts of Gold by Solvents Extraction.** W. A. E. McBryde and John H. Yoe. *Analytical Chemistry,* v. 20, Nov. 1948, p. 1094-1099.
Color formation is immediate and permanent in solutions with pH less than 4, if a large excess of chloride is avoided. Sensitivity compares favorably with existing procedures. Small amounts of gold may be extracted from 2 M HBr solutions with isopropyl ether, thereby effecting separation from other metals with colored ions. 25 ref.

**10c-98. Controlled Procedures Effect Quantity Production of Reclaimed Copper Base Alloys.** A. E. St. John. *Steel,* v. 123, Nov. 29, 1948, p. 76-78, 104.
Modern assaying practice which controls sorting, furnace charging, melting, refining, and casting.

**10c-99. The Determination of Silicon in Nickel Alloys.** J. T. Minster. *Analyst,* v. 73, Sept. 1948, p. 507.
The colorimetric method for its determination.

**10c-100. Essais des matériaux dans l'industrie metallurgique.** (Testing of Materials in the Metallurgical Industry.) (Also in German.) A. Meyer. *Pro-Metal,* v. 1, July, 1948, p. 116-124, 137-141.
Methods for quantitative volumetric and gravimetric analysis of copper alloys are discussed with emphasis on determination of Cu, Zn, Sn, Pb, and Fe in bronzes and brasses. (To be continued.)

**10c-101. Spectrographic Analysis of Permalloys.** (In Russian.) A. V. Borsova and N. N. Sorokina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1098-1100.
Proposes improved method with emphasis on determination of Ni and Mo.

**10c-102. Analysis of Alloys Containing Mainly Chromium and Cobalt.** (In Russian.) G. I. Zhuravlev and P. N. Tereshchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Sept. 1948, p. 1101-1105.
According to the complete analytical procedure, Ni, Mo, Mn, Fe, and Si are determined spectrographically and Cr, C, and S by chemical methods. Results indicate applicability to industrial use.

**10c-103. Paper Chromatography of the Noble Metals.** Michael Lederer. *Nature,* v. 162, Nov. 13, 1948, p. 776-777.
Separation of Au, Pt, Pd, Cu, and Ag and superiority over ordinary chemical methods of analysis.

**10c-104. Iron in Brass and Bronze; Rapid Colorimetric Determination.** Milton Sherman. *American Foundryman,* v. 14, Dec. 1948, p. 55-56.
The literature was surveyed prior to a systematic study of the use of thioglycollic acid. Procedure, results of typical analyses of standard samples, and effects of various cations and anions.

### 10d—Light Metals

**10d-27. Konduktometrische Mikrobestimmung von Kohlenstoff, insbesondere zur Ermittlung seines Gehaltes in Aluminium.** (Conductometric Microdetermination of Carbon, Particularly the Determination of Its Content in Aluminum.) H. R. Bolliger and W. D. Treadwell. *Helvetica Chimica Acta,* v. 31, Aug. 2, 1948, p. 1247-1259.

The method depends upon combustion in circulating oxygen. The $CO_2$ formed is conductometrically determined after absorption in aqueous NaOH, with an accuracy of $\pm 0.5\gamma$ of C.

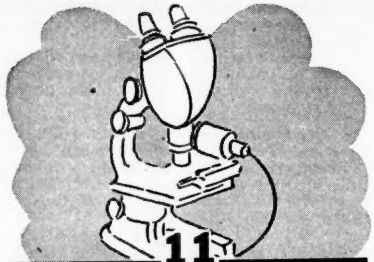
**10d-28. Dosage spectrophotométrique du magnésium.** (Spectrophotometric Determination of Magnesium.) Y. Rusconi, D. Monnier, and P. E. Wenger. *Helvetica Chimica Acta,* v. 31, Oct. 15, 1948, p. 1549-1552.

Magneson (p-nitrobenzene-azo-resorcinol) is utilized as the color-producing reagent. A precision of 1% is obtained for amounts as low as 2 to 10 mg. of magnesium. Limits of application are 0.02 to 0.16 g. per liter. The effect of Zn and Al.

**For additional annotations indexed in other sections, see:**

**7b-222.**





## 11 APPARATUS, INSTRUMENTS and METHODS

**11-275. Photomicrography of Large Specimen Areas.** *Photographic Journal,* v. 88B, Sept.-Oct. 1948, p. 89.

High magnification of a large area of a metallurgical specimen. In this improved technique, the area to be examined is given only a small initial magnification by microscope so that the whole region is included in the picture. The negative is recorded on a maximum resolution plate, and further magnification is then obtained by enlargement. The result is achieved without undue loss of definition.

**11-276. A Numerical Fourier-Analysis Method for the Correction of Widths and Shapes of Lines on X-Ray Powder Photographs.** A. R. Stokes. *Proceedings of the Physical Society,* v. 61, Oct. 1948, p. 382-391.

A method is derived, using Fourier analysis for finding the corrected distribution of intensity across an X-ray diffraction line. The method may also be of use in spectrum analysis and statistical problems. 11 ref.

**11-277. Surface Layers of Crystals.** P. B. Hirsch and J. N. Kellar. *Nature,* v. 162, Oct. 16, 1948, p. 609-610.

X-ray method which gives the thickness of the surface layer without altering it physically. It involves measurement of the variation in the intensity of X-ray reflection from a crystal, as the angle between the surface and the Bragg reflecting planes is varied.

**11-278. The Use of Electronic Instruments in Iron and Steel Making.** S. S. Carlisle. *Engineer,* v. 186, Oct. 29, 1948, p. 450-451; Nov. 5, 1948, p. 476-477. A condensation.

**11-279. Drilling Very Hard Materials.** David A. Vermilyea. *Metal Progress,* v. 54, Nov. 1948, p. 686.

Application of a method commonly used for glass lens blanks to alloys such as Duriron, Stellite, or some of the new gas-turbine alloys.

**11-280. A Tilting Stage for Leveling Metallographic Specimens.** E. C. Pearson. *Metal Progress,* v. 54, Nov. 1948, p. 686-687.

Leveling device is a simplified modification of the universal stage that has been used on petrographic microscopes.

**11-281. Using Tempilstiks for Determining the Heat Losses of a Furnace.** Leo Satz. *Metal Progress,* v. 54, Nov. 1948, p. 687.

To obtain temperature-distribution curves for the outer walls of a furnace, chalk guide lines were drawn traversing the wall in four

or more directions and intersecting at the center. By the use of "Tempilstiks" (temperature-indicating crayons), temperature gradients along each guide line were easily found.

**11-282. A Camera for Microradiography.** Gerard H. Boss. *Metal Progress*, v. 54, Nov. 1948, p. 689.

The photographic plate is as close to the specimen as possible and the specimen is properly lined up with the X-rays.

**11-283. New Tool of Heat-Flow Research in the Glass Industry and the Ceramic Industry at Large.** Victor Paschkis. *American Ceramic Society Bulletin*, v. 27, Nov. 15, 1948, p. 450-461.

Problems of temperature fields and rates of heat flow investigated by means of electric analogy. The method is based on the identity of the differential equations for heat flow in a solid and for electric current in a body with evenly distributed resistivity and capacity. It was applied to a large number of problems in various fields including the solidification of ingots and castings, temperature loss from intermittently operated furnace walls, and influence of through-metal on the insulating value of thermal insulation.

**11-284. Camera for Structural Analysis, Having a Revolving Collimator and a Flat Plate Adapter, and Its Use.** (In Russian.) D. B. Gogoberidze. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, June 1948, p. 823-826.

Described and illustrated. Typical X-ray diagrams obtained.

**11-285. Studies of the Mattson Shot Classifier.** Raymond L. Blaine and Harold J. Valis. *Journal of Research of the National Bureau of Standards*, v. 41, Nov. 1948, p. 371-378.

Size and distribution of peening and cleaning shot and sand particles of various shapes were determined by use of a new apparatus, with a microscope and by microweighings. Results indicated that the Mattson apparatus is satisfactory for visual evaluation. A more precise evaluation can be made with the apparatus by determining actual size distributions.

**11-286. Multipoint Recording With a Pen Recorder Applied to Magnetic Measurements.** H. M. Allred. *Review of Scientific Instruments*, v. 19, Nov. 1948, p. 818-819.

A simple, convenient method for obtaining an essentially continuous pen record of the force experienced by the sample in the field of a strong electromagnet and the temperature of the sample as it is heated by a small furnace.

**11-287. A New Method for the Determination of Preferred Orientations.** (In English.) J. F. H. Custers. *Physica*, v. 14, Sept. 1948, p. 453-460.

Method for determination of preferred orientations of flat specimens using rolled metal sheets. It is shown that this method implies a somewhat easier construction of pole figures and will simplify appreciably calculation of absorption.

**11-288. The Intensity Distribution Along the Debye Halo of a Flat Specimen in Connection With a New Method for the Determination of Preferred Orientations.** (In English.) J. F. H. Custers. *Physica*, v. 14, Sept. 1948, p. 461-474.

Referring to preceding article (see above abstract), formulas for intensity distribution along the Debye halo are given for specimens with random orientation of crystallites. The same formulas may be used to correct for the strongly varying absorption along the Debye halo when preferred orientations are to be determined quantitatively.

**11-289. 16 Mm. Cinematography at the National Physical Laboratory.** J. A. Hall. *British Science News*, v. 2, No. 13, 1948, p. 19-20.

Applications to testing of ship models, wing-flutter investigations, lag constants of temperature-measuring instruments, and temperatures of liquid-steel streams.

**11-290. The Cinematography of Open-Hearth Furnace Flames.** J. H. Chesters. *Journal of the Society of Glass Technology* (Transactions Section), v. 32, Aug. 1948, p. 209-210.

Application of above technique enabled flame structure, height and velocity to be studied with valuable results.

**11-291. Nouvelle méthode d'étude aux rayons X des textures cristallines.** (A New Method for X-Ray Investigation of Crystal Structure.) A. Guinier and J. Tennevin. *Revue de Métallurgie*, v. 45, Aug. 1948, p. 277-286.

Specially developed apparatus. Application to the solution of a series of problems.

**11-292. Photography and Steel Fabrication.** Frank L. Carder. *PSA Journal*, v. 14, Nov. 1948, p. 680-682.

Photographic methods used by the metallurgist in his attempt to produce steel fabricated vessels which meet standards.

**11-293. Instrumentation; First Report of the Open-Hearth Sub-Committee.** F. L. Robertson. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 540-541; discussion, p. 593-595.

Presents recommendations.

**11-294. X-Ray Measurement of Strain in Metal.** *Welding Journal*, v. 27, Dec. 1948, p. 612s-613s.

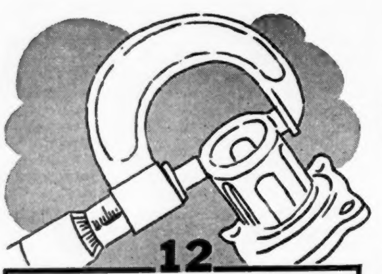
Previously abstracted from *Journal of Research of the National Bureau of Standards*, v. 40 April 1948, p. 285-293.

**11-295. A New Method of Determining X-Ray Intensities.** N. C. Baenziger. *Journal of Chemical Physics*, v. 16, Dec. 1948, p. 1175-1176.

New solution to the problem of determining integrated intensities of X-ray reflections recorded on film which involves radioactive toning of the photographic film.

**11-296. Electronics Provide a Better Precision Control Tool.** Amos J. Germain. *Production Engineering & Management*, v. 22, Dec. 1948, p. 55-58.

Why and how electronic tubes function and typical examples of use of electronics in mass-production metalworking plants.




## INSPECTION and STANDARDIZATION

### 12a—General

**12a-117. Statistical Methods and Engineering Processes.** Bernard P. Dudding and W. J. Jennett. *Engineering,* v. 166, Oct. 22, 1948, p. 405-407; Oct. 29, 1948, p. 429-430. A condensation.

Their scope in relation to the engineering industries.

**12a-118. Proposed Gage Manufacturing Tolerances.** Gilbert A. Marshall. *Machinery,* v. 55, Dec. 1948, p. 175-178.

Intended as an introduction to the problem, and not as a complete analysis.

**12a-119. Machinery's Data Sheets 623 and 624.** *Machinery,* v. 55, Dec. 1948, p. 245.

Dimensions of standard keyway broaches.

**12a-120. Designating Surface Roughness With the Aid of Geometric Standards.** Clayton R. Lewis and Arthur F. Underwood. *Machine Design,* v. 20, Dec. 1948, p. 137-140.

Previously abstracted from *Steel,* v. 123, July 19, 1948, p. 90-92, 124. See item 12a-72, 1948.

**12a-121. Ultrasonic Weld Inspection Facilitated by Angle Beam Searching Unit.** *Steel,* v. 123, Dec. 13, 1948, p. 98, 100, 103.

Instrument which tests for lack of bond, inclusions, or voids when placed on parent metal adjacent to or within 3 to 6 in. of the weld.

**12a-122. Quality Control Methods Brought Down to Earth.** Irving W. Burr. *American Foundryman,* v. 14, Dec. 1948, p. 43-47.

Methods as applied in the foundry.

**12a-123. Production Data Sheet; Length of Metal Required for Right Angle Bend When Radius and Thickness Are Known.** A. C. Siegel. *Production Engineering & Management,* v. 22, Dec. 1948, p. 71.

**12a-124. Weight Tables for Screw-Machine Products.** *American Machinist,* v. 92, Dec. 16, 1948, p. 135, 137, 139.

Developed from mill-run samples. No reliance was placed on theoretical densities of materials. Thus, they are based on the actual densities of a specific kind of steel, of brass, and of aluminum.

### 12b—Ferrous

**12b-76. Weld Inspection by Combining Both Supersonic and X-Ray Methods.** Herbert R. Isenburger. *Chemical Engineering,* v. 55, Nov. 1948, p. 155-156.

Advantages of combination procedures for low-carbon steel welds.

**12b-77. Case Hardness "Pattern".** F. V. Horak. *Metal Progress,* v. 54, Nov. 1948, p. 686.

Tempering at 950° F. enables parts to be sawed readily. A light grind or polish smoothes the surface for etching. An ammonium persulphate etch brings out the originally hardened zone in sharp contrast to the unhardened core.

**12b-78. Using the Scleroscope for Testing the Depth of Shallow, Hardened Cases.** B. Z. Berman. *Metal Progress,* v. 54, Nov. 1948, p. 688.

Tests were made only on sheet metal screws, cyanided and then quenched in cold water. However, the method also should be useful for testing many light-case parts and particularly nitrided parts.

**12b-79. Fits, Tolerances and Finishes.** Myles F. Harr. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 87-92; discussion, p. 92-93.

How standardization of fits, tolerances, and finishes developed by A.S.A. and A.I.S.E. is resulting in plant economies.

**12b-80. Standard Grades of Pig Iron; American Iron and Steel Institute.** *Foundry,* v. 76, Dec. 1948, p. 137.

**12b-81. Metallurgical Control of Deep Drawn Stampings From Cold Rolled Steel. Part II.** N. E. Rothenthaler. *Tool & Die Journal,* v. 14, Dec. 1948, p. 46-48, 50-51.

Metallurgical control group of Ford Motor Co. observes and records daily steel performance on all deep-drawing operations. Any disturbing factor which is causing poor performance is quickly determined and adjustment is made.

**12b-82. H-Band Steels Aid Heat Treaters.** D. H. Ruhnke, E. T. Walton, and P. R. Wray. *Steel,* v. 123, Dec. 13, 1948, p. 88-90, 115.

Development of hardenability bands, principles and methods of use, and experiences of users. Advantages.

**12b-83. Standard Grades of Ferroalloys; American Iron and Steel Institute.** *Foundry,* v. 76, Dec. 1948, p. 138.

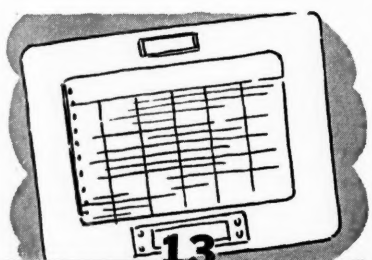
Description and tabular material. (To be concluded.)

**12b-84. Field Experience on Gamma Ray Inspection of Welds in a High Pressure Pipe Line.** A. B. Lauderbaugh and S. A. Brosky. *Gas Age,* v. 102, Dec. 9, 1948, p. 25-27.

**12b-85. Practical Inspection Lowers Scrap and Rework.** Jack Shafer. *American Machinist,* v. 92, Dec. 16, 1948, p. 112-115.

System by which defects have been cut as much as 85%.

**For additional annotations indexed in other sections, see: 19b-162; 27a-157.**




## TEMPERATURE MEASUREMENT and CONTROL

**13-47. Apparatus and Procedure for Testing Pyrometer Switches.** J. T. Cataldo and Wm. R. Dravneek. *Instruments,* v. 21, Nov. 1948, p. 1014-1015.

In connecting a number of thermocouples to a common indicating or recording instrument, multi-position selector switches are used. Efficient performance of these switches is essential but cannot be determined by ordinary voltage readings. Suitable apparatus and procedure.

**13-48. Revisions for a Precision High Temperature Control Unit.** Samuel Steingiser, George J. Rosenblit, and Charles E. Waring. *Review of Scientific Instruments,* v. 19, Nov. 1948, p. 815-816.

Several modifications of the circuit proposed by Waring and Robison for high-temperature furnace control, which have proven useful.

**13-49. Automatic Temperature Control of Slot or Batch Type Forging Furnaces.** E. A. Murphy. *Steel Processing,* v. 34, Nov. 1948, p. 609-611.

Temperature-control systems and instruments manufactured by Brown Instrument Co. and problems involved in proper control.

**13-50. Electronic Controls for Regulating Temperature.** Homer B. Clay. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 78-82.

System developed primarily for air-conditioning service but which is also useful in other heat-control applications.

**13-51. The Fundamentals of Pyrometry: I and II.** W. H. Steinkamp. *Industrial Heating,* v. 15, Oct. 1948, p. 1689-1690, 1692, 1694, 1813-1817; Nov. 1948, p. 1922, 1924, 1926, 1928.

Part I consists of introduction to the subject. Part II describes specialized types of potentiometers, especially the "Electronik" instruments made by Minneapolis-Honeywell. (To be continued.)

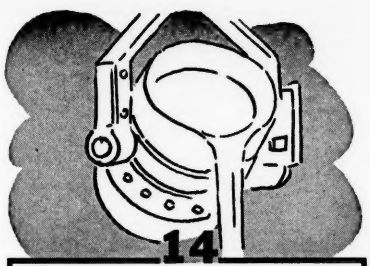
**13-52. The Influence of Smoke and Atmospheric Absorption on Optical Pyrometry in Steelworks.** J. A. Hall. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 271-276.

Measurements were made of atmospheric absorption in a steel foundry and in an openhearth melting shop. Smoke from tapping or teeming operations may give rise to errors as high as 60° C. It is suggested that the correction for atmospheric absorption is likely to be between 2 and 6° C. for each 10-ft. between the pyrometer and the liquid-steel, and that the additional correction for local smoke will probably be between 5 and 15° C.

**13-53. O.-H. Instrumentation; Requirements for Different Classes of Furnace.** E. Rogers. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 532-540; discussion, p. 593-595.

Principles which govern the application of instruments to openhearth furnaces.

**For additional annotations indexed in other sections, see: 11-293.**



# 14 FOUNDRY PRACTICE

## 14a—General

**14a-171. Les procédés de fabrication des usines metallurgiques suisses. 2. La fonderie.** (Fabrication Procedures in the Swiss Metallurgical Industry. 2. The Foundry.) (Also in German.) O. H. C. Messner. *Pro-Metal,* v. 3, May 1948, p. 57-67.
Described and illustrated. (To be continued.)

**14a-172. Select Mold and Core Wash to Meet Casting Conditions.** J. A. Ridderhof. *American Foundryman,* v. 14, Nov. 1948, p. 55-58.
Procedure and selection recommendations.

**14a-173. Specialized Foundry Control for Composite Castings.** Arthur K. Higgins. *Metal Progress,* v. 54, Nov. 1948, p. 679-682.
Problems involved in casting an alloy base around a group of prefabricated inserts which must bear tensile and fatigue loads, specifically the fixing of forged turbine blades into cast wheel segments. How proper techniques can reduce foundry losses to 0.2% over long periods.

**14a-174. Handling Materials in Metal Charging.** Robert H. Herrmann. *Foundry,* v. 76, Dec. 1948, p. 80-85, 218, 221, 224.
Equipment used for charging metals in the foundry melting department.

**14a-175. New Mold Coating Widens Centrifugal Casting Use.** John Anthony. *Iron Age,* v. 162, Dec. 2, 1948, p. 94-98.
A metal-mold centrifugal-casting technique using a special type of refractory coating which permits more exact and orderly distribution of metal in the spinning mold. This development makes commercially feasible the production of long tubular shapes in stainless, toolsteels, and nonferrous metals, as well as the usual range of cast steel and cast iron.

**14a-176. Foundry Sands Evaluated—Naturally Bonded Vs. Synthetic Sands.** C. A. Sanders. *Refractories Journal,* v. 24, Oct. 1948, p. 369-376.
Previously abstracted from *American Foundryman,* v. 14, Sept. 1948, p. 45-49. See item 14a-154, 1948.

**14a-177. Chemically Coated Sand; A New Bonding and Refractory Process for Foundries.** W. A. Turner. *Iron and Steel,* v. 21, Nov. 1948, p. 483-484.
Process invented by Bonheur M. Weston and exhibited at 52nd annual A.F.A. meeting, Philadelphia, May 1948, in which molding sand is coated with a plasticized hydrocarbon, with a consequent reduction by roughly 50% of the conventional additions of clay and water, and the complete elimination of coal dust.

**14a-178. Abreuvage des noyaux.** (Soaking of Cores.) Pierre Nicolas. *Fonderie,* v. 32, Aug. 1948, p. 1283.
The penetration of molten metal into the pores of foundry cores and its prevention.

**14a-179. Precision Casting—New Tool in Metal Working.** *Inco Magazine,* v. 22, No. 4, 1948, p. 4-9.
Process and applications.

**14a-180. Adequate Dust Control Keeps Foundry Clean.** Allen D. Brandt. *American Foundryman,* v. 14, Dec. 1948, p. 35-42.
Equipment and methods. 12 ref.

**14a-181. Wood Flour Additions Aid in Foundry Sand Control.** C. A. Sanders. *American Foundryman,* v. 14, Dec. 1948, p. 50-54.

## 14b—Ferrous

**14b-116. Problems of Contraction and Distortion in Cast-Iron Castings.** E. Longden. *Foundry Trade Journal,* v. 85, Oct. 7, 1948, p. 343-347; Oct. 21, 1948, p. 381-387, discussion, p. 387-389.
Continuation of previous work gives briefly certain data and developments which can be immediately put into practice to help in overcoming some very fundamental difficulties associated with the contraction of ferrous castings carrying members with varying cooling gradients. An automatic contraction-recording mechanism and data on cooling vs. dimensional changes for white and gray-iron bars. In the second part, stress relief by air cooling and use of a camber graph for calculating expected contraction are described.

**14b-117. Moulding and Casting a 5-Ton Ingot Mould.** J. Steele. *Foundry Trade Journal,* v. 85, Oct. 28, 1948, p. 415-416.
One method of making the core and mold for the above casting.

**14b-118. Using Structure Diagrams in Gray Iron Foundries.** Sven H. Torreson. *American Foundryman,* v. 14, Nov. 1948, p. 40-47.
Detailed critical analysis and description of the various diagrams and methods for their use proposed by different investigators. Attempts to use these diagrams in a Swedish foundry, the difficulties encountered, and the modifications made before the present practice was finally adopted. Charging diagrams and tables used in production of three or four types of cupola iron and three types of electric-furnace iron.

**14b-119. Increasing Casting Yields; Steel Foundry Uses Exothermic Pipe Eliminator.** Paul von Colditz. *American Foundryman,* v. 14, Nov. 1948, p. 48-51.
Use of thermit pipe eliminator, which has proven to be beneficial from both a feeding and a cost point of view, particularly on castings having different sized risers or risers at different levels; also for specific risers such as for wheels with high center hubs.

**14b-120. Controlling Malleable Sand Properties.** R. P. Schauss. *American Foundryman,* v. 14, Nov. 1948, p. 52-54.
Practice of different types of procedures; effects of fineness of sea coal on properties; and recommended procedures.

**14b-121. Steel Foundry Practice and Maintenance.** Francis J. Macano. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 98-103; discussion, p. 103-104.
At one steel foundry.

**14b-122. Mold Hot-Top is Controlled Automatically.** F. A. Furfari. *Foundry,* v. 76, Dec. 1948, p. 188-189.
Unusual method for keeping the head metal in molds for steel rolling mill rolls in a molten state to compensate for shrinkage as the metal in the main part of the mold cools. It involves use of a "hot-top", consisting of two carbon electrodes which maintain an arc on top of the casting between the metal and the electrodes.

**14b-123. Mechanizes Malleable Iron Foundry.** Pat Dwyer. *Foundry,* v. 76, Dec. 1948, p. 74-77, 190, 192, 194, 196, 198.
Equipment and procedures.

**14b-124. Precision Castings; Production Methods for Steel and Cast Iron.** (Concluded.) Frank Hudson. *Iron and Steel,* v. 21, Nov. 1948, p. 475-477.
Use of centrifugal force as an alternative to air injection or vacuum pouring in investment casting. Castability of six irons and steels ranging from pure iron to Vitallium. Cleaning and inspection, applications in general engineering, design for economical production, and production methods for cast iron.

**14b-125. Patterns and Molding Methods for Steel Castings. II.** John Howe Hall. *Foundry,* v. 76, Dec. 1948, p. 92-95, 209-210, 212, 214, 216.
Equipment and methods used in the making of molds for steel castings. (To be continued.)

**14b-126. Enriching Cupola Blast with Oxygen Additions.** *American Foundryman,* v. 14, Dec. 1948, p. 57-59.
Fourth of a series dealing with modern cupola operation.

**14b-127. Controlled Cooling of Ferrous Castings.** Emilio Infante Pedroso. *American Foundryman,* v. 14, Dec. 1948, p. 60-62.
Technique which is applied to large castings, for instance acid crucibles about 4 ft. in diameter. Thermocouples are placed in the mold in contact with sections of different thickness. Compressed air or water is used to maintain uniform cooling rates.

**14b-128. Gray Iron in the Jobbing Foundry.** F. W. Kellam. *Canadian Metals & Metallurgical Industries,* v. 11, Dec. 1948, p. 20-22, 31.
Procedures used to produce different grades consecutively in the cupola.

## 14c—Nonferrous

**14c-58. Continuous Casting; Application of the Asarco Process to Copper-Base Alloys.** J. S. Smart, Jr., and A. A. Smith, Jr. *Metal Industry,* v. 73, Oct. 29, 1948, p. 347-349; Nov. 5, 1948, p. 372-373. A condensation.
Previously abstracted from *Iron Age,* v. 162, Aug. 26, 1948, p. 72-80. See item 14c-50, 1948.

**14c-59. Using Non-Ferrous Melting Stock to Best Advantage** Hiram Brown. *American Foundryman,* v. 14, Nov. 1948, p. 63-65.
Recommendations for most efficient use of raw material, such as gating design; scrap segregation; saving of dross, skimmings, or grindings; selection of metal for purchase; handling melting stock; standardization of specifications.

**14c-60. Close Control Required in Casting High-Conductivity Copper Alloys.** Paul G. Maganus. *Materials & Methods,* v. 28, Nov. 1948, p. 69-71.
Methods and equipment used by Warren Foundry Div., Progressive Welder Co.

**14c-61. Centrifugal Casting of Copper-Tin Alloys.** *Machinery* (London), v. 73, Nov. 4, 1948, p. 645. Based on B.I.O.S. Report No. 1797.
German method.

**14c-62. La fusione sotto pressione.** (Die Casting.) Domenico Piva. *La Metallurgia Italiana,* v. 40, July-Aug. 1948, p. 142-148.
Different types of machines and their characteristics. Metals and alloys most convenient for this proc-

ess are enumerated. Possible rates of production and obtainable tolerances.

**14c-63. Shop Shots in New National Bearing Non-Ferrous Foundry.** *Machinery,* v. 55, Dec. 1948, p. 180-181.
Includes machine-shop photographs.

**14c-64. New Nonferrous Foundry Opened by American Brake Shoe Co.** *Steel,* v. 123, Dec. 6, 1948, p. 120, 167.

**14c-65. La fusion et le moulage des métaux précieux et de leurs alliages. La fusion sous vide et le moulage en cire perdue.** (The Melting and Casting of Precious Metals and Their Alloys. Vacuum Melting and Casting by the Lost-Wax Process.) Edwin Rhodes. *Fonderie,* v. 32, Aug. 1948, p. 1271-1282.
Physical properties and applications of the different commonly encountered precious metals and alloys, and applications of the lost-wax process. 14 ref.

**14c-66. The Importance of Cores in Die Casting Design.** C. R. Maxon. *Die Castings,* v. 6, Sept. 1948, p. 30-32, 62-65.
Previously abstracted from *Mechanical Engineering,* v. 70, July 1948, p. 609-613. (To be cont.) See item 14c-43, 1948.

**14c-67. Die Casting in Sweden—1914-48.** H. K. Barton. *Machinery* (London), v. 73, Nov. 25, 1948, p. 743-746.
Equipment and typical die-cast articles.

**14c-68. Degassing Nonferrous Metals.** E. Kurzinski. *Foundry,* v. 76, Dec. 1948, p. 72-73, 142, 145, 148, 152, 154.
Various sources of gas porosity and the different ways to eliminate it. Primarily concerned with the elimination and prevention of only that porosity which is due to the presence of dissolved gases, and with improvement in the soundness and cleanliness of cast metal through the removal of oxides and other inclusions. Advantages and applications of flushing with inert gas. (To be concluded.)

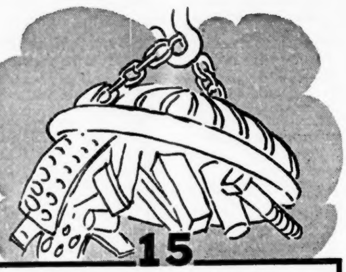
**14c-69. Precision Dies Mass-Produce Die-Castings.** Harold E. Nagle. *American Machinist,* v. 92, Dec. 16, 1948, p. 77-81.
Inserted dies in multiple cavities and movable-side cores make possible zinc die-castings for internal lock parts that require little machining.

### 14d—Light Metals

**14d-60. Un tour d'horizon sur les fonderies Francaises d'alliages-legers. IV. Les defauts de fonderie.** (Survey of French Light-Alloy Foundries. IV. Casting Defects.) (Concluded.) Charles Roinet. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 311-318.
The most important defects occurring during commercial casting of light alloys. Causes and prevention of such defects.

**For additional annotations indexed in other sections, see:**
**5a-66; 23c-74; 24b-117; 24c-16; 27c-22.**





## 15 SCRAP and BYPRODUCT UTILIZATION

### 15a—General

**15a-17. La question du déchet dans l'industrie métallurgique de son influence sur le cout du produit manufacture.** (The Problem of Waste in the Metal Industry; Influence on Cost of Finished Products.) (Also in German.) Etienne de Coulon, Philippe de Coulon, and O. H. C. Messner. *Pro-Metal,* v. 3, May 1948, p. 50-55.
Studied with particular emphasis on cost factors. Methods of evaluation of waste materials are indicated by a series of schematic diagrams.

### 15b—Ferrous

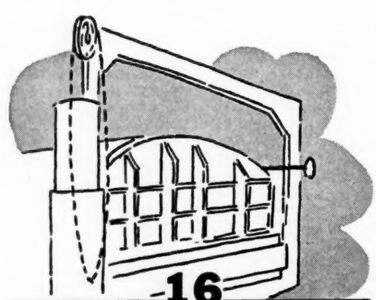
**15b-62. Steel Mill Wastes Converted From Nuisance to Profit.** *Chemical Industries,* v. 63, Nov. 1948, p. 784-785.
How chemical company will process spent pickle liquor to produce zinc and iron salts and galvanizing wastes to produce zinc oxide at new plant being built.

**15b-63. What Is the Best Way to Repair Cast Iron.** K. H. Koopman. *Welding Journal,* v. 27, Nov. 1948, p. 951-954.

### 15c—Nonferrous

**15c-7. Nonferrous Gas-Fired Zinc Stills.** *Industrial Gas,* v. 27, Nov. 1948, p. 15.
Used for secondary recovery.

**15c-8. Reclamation of Zinc in Stills.** *Industrial Heating,* v. 15, Nov. 1948, p. 1930, 1932.
Method and equipment.



## 16 FURNACES and HEATING DEVICES

### 16a—General

**16a-109. The Calculation of Heat Transfer Through Two-Media Furnace Walls.** Agnes H. Waddell. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 205-220.
Mathematical analysis of the problem. 12 ref.

**16a-110. Pre-Mixed Combustion for More Efficient Process Heating in Industry.** Edward J. Funk, Jr. *Industrial Heating,* v. 15, Nov. 1948, p. 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1916.
Equipment, methods of mixing, advantages, factors to be considered, and applications.

**16a-111. Automatic Drying Ovens.** Christian F. Scheehle, Jr. *National Lithographer,* v. 55, Nov. 1948, p. 34-35, 76, 78.
History and present-day ovens for drying and baking finishes on metals.

**16a-112. Power Requirements for Heating Materials by Infra-Red.** *Materials & Methods,* v. 28, Nov. 1948, p. 95.
Approximate determinations for common metals and non-metals, as well as for any material whose specific heat is known.

**16a-113. Starting a Hydryzing Generator.** Paul E. Busby and Cecil C. Busby. *Metal Progress,* v. 54, Nov. 1948, p. 689.
Setup using a natural-gas pilot flame to avoid the dirt and inconvenience associated with use of an ignited oily rag.

**16a-114. Factors Affecting Infrared Tunnel Design.** *Sheet Metal Worker,* v. 39, Nov. 1948, p. 35-37.
Design of drying tunnels for painted or enameled metal objects.

**16a-115. Induction Heating in Relation to Industrial Gas Heating.** S. L. Case, L. R. Jackson, and R. J. Lund. *American Gas Association* (New York), March 1948, 47 pages.
Findings of a survey made to appraise the competitive position of gas and induction heating and to attempt to predict their future position. Various types of burners and industrial furnaces. Appraisal includes technological and economic aspects.

**16a-116. Protective Atmospheres in Industry. Part I.** A. G. Hotchkiss and H. M. Webber. *General Electric Review,* v. 51, Nov. 1948, p. 29-35.
Miscellaneous applications, including necessary equipment. This section is devoted mainly to metallurgical applications, but also mentions uses in the paint and varnish industry. Compositions and production costs of typical atmospheres. (To be continued.)

**16a-117. Elimination of Standing Waves on Electrodes for High-Frequency Dielectric Heating.** E. R. Bell and M. E. Dunlap. *Technical Data Digest,* v. 13, Dec. 15, 1948, p. 13-21.
Standing waves on long electrodes can be avoided by multiple tuning with use of relatively high frequencies, and by connecting the generator to the electrodes at two points when using low frequencies. The choice of method depends upon several factors, such as type of press, and voltage limitations. Both methods, and also the procedure of heating a long member in successive short sections, appear to be equally satisfactory.

### 16b—Ferrous

**16b-105. Tracer Study of Sulphur in the Coke Oven.** S. E. Eaton, R. W. Hyde, and B. S. Old. *Metals Technology,* v. 15, Oct. 1948, T.P. 2453, 20 pages.
Details of large scale study made to determine the principal sources of sulphur in coke as a guide in selective purchasing of coal. Small amounts of iron pyrites were prepared from radioactive sulphur, mixed thoroughly with the coal charge of a full-scale coke oven, the

mixture coked under normal conditions, and the course of the pyritic sulphur traced. Results show no preferential removal of either of the two forms of sulphur during coking. 13 ref.

**16b-106. Gas Control in an Integrated Steelworks.** *Coke and Gas.* Oct. 1948, p. 347-353.

At the Corby works of Stewarts and Lloyds Limited the supply of coke-oven and blast-furnace gas to the various departments is centrally supervised in order to coordinate gas production, gas consumption, power supply, and steel production.

**16b-107. Gas Carburizing Plant.** Laidler. *Machinery* (London), v. 73, Oct. 28, 1948, p. 608-610.

Advantages of the process. Design of the plant and its operation.

**16b-108. Burn Waste Coke in Cupola.** W. A. Engelhart and H. W. Arterburn. *American Foundryman,* v. 14, Nov. 1948, p. 59-60.

Briquetting of coke breeze with a Portland cement and lime binder, so that it can be utilized as cupola fuel.

**16b-109. Cover Type Annealing Furnaces Speed Production for the Columbia Steel Co.** *Industrial Heating,* v. 15, Nov. 1948, p. 1882-1884, 1886, 1888, 1890.

**16b-110. Chicago Steel Treating Company Offers Diversified Service: II.** (Concluded.) *Industrial Heating,* v. 15, Nov. 1948, p. 1988-1990, 1992, 1994, 1996, 2038.

The general heat treating equipment, including a continuous furnace, a shaker hearth furnace, gas carburizing, semimuffle and tempering furnaces, an induction heater, atmosphere generators, quench tanks, washing machine, surface-finishing equipment, inspection and straightening equipment, materials-handling, and maintenance.

**16b-111. Experimental Furnaces of the British Iron and Steel Research Association.** Max Davies. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1332-1334.

Previously abstracted from *British Science News,* v. 1, no. 8, 1948, p. 2-5. See item 16b-61, 1948.

**16b-112. Off-Site Blast Furnace Construction.** *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 105-106.

New scheme utilized to save two months of production time.

**16b-113. New Heating Furnaces Boost Forging Output.** Herbert Chase. *Iron Age,* v. 162, Nov. 18, 1948, p. 113-116.

Introduction of new rotary hearth furnaces with full automatic controls has increased uniformity of forgings, increased capacity, and saved both space and fuel. Use for various forging jobs.

**16b-114. Fuel Oil in Furnaces; Use in the Iron and Steel Fabricating Industry.** (Concluded.) M. Roddan. *Iron and Steel,* v. 21, Nov. 1948, p. 493-495.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16b-87, 1948.

**16b-115. Alloy Steel Forgings; Cyclic Annealing.** *Iron and Steel,* v. 21, Nov. 1948, p. 496.

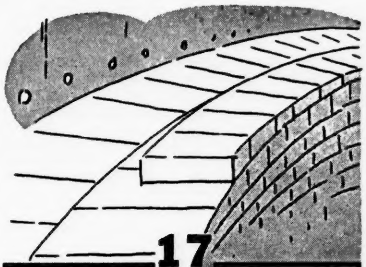
Process and equipment developed.

**16b-116. The Application of the Results of Some Steel Furnace Trials to Glass Furnace Practice.** M. W. Thring. *Journal of the Society of Glass Technology* (Transactions Section), v. 32, Aug. 1948, p. 189-208.

While the emphasis in glass-tank research is somewhat different from that in steel furnaces, a study of port design in the latter gave results which can be of interest in the former.

**16b-117. Cowper Stoves; The Varying-Turbulence Type and the C.S.I. Standard Stove.** Daniel Petit. *Iron and Steel,* v. 21, Nov. 18, 1948, p. 565-568; discussion, p. 584-585.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 131-138. See item 16b-104, 1948.



## 17 REFRACTORIES and FURNACE MATERIALS

**17-92. Factors in Service Behavior of Silica Brick.** L. A. Smith. *Industrial Heating,* v. 15, Sept. 1948, p. 1572, 1574, 1576, 1578; Oct. 1948, p. 1800, 1802; Nov. 1948, p. 1980, 1982, 1984, 1986, 2034, 2036, 2038.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, June 1948, p. 701-706. See item 17-59, 1948.

**17-93. Recent Developments in Refractories and Their Applications.** W. F. Rochow and C. A. Brashares. *Chemical Engineering Progress* (Transactions Section), v. 44, Nov. 1948, p. 869-872.

Especially for high-temperature applications.

**17-94. Pure Oxide Heavy Refractories.** O. J. Whittemore, Jr. *Chemical Engineering Progress* (Transactions Section), v. 44, Nov. 1948, p. 872-874; discussion, p. 875.

Properties of new alumina, magnesia, and stabilized zirconia refractories. These properties indicate that refractories of this type can be used to line industrial furnaces for operation at very high temperatures.

**17-95. Zircon and Zirconia Refractories.** W. J. Baldwin. *Chemical Engineering Progress,* (Transactions Section), v. 44, Nov. 1948, p. 875-878.

Properties and present and potential applications. 18 ref.

**17-96. Investigation of Abrasion Resistance of Various Refractories.** Kenneth A. Baab and Hobart M. Kraner. *Journal of American Ceramic Society,* v. 31, Nov. 1, 1948, p. 293-298.

See abstract of condensed version in *Industrial Heating,* v. 15, July 1948, p. 1206, 1208. See item 17-74, 1948.

**17-97. An Evaluation of Basic Brick in the Open Hearth.** Vernon W. Jones. *Steel,* v. 123, Nov. 22, 1948, p. 91, 94, 97-98.

Previously abstracted from *Blast Furnace and Steel Plant,* v. 36, July, 1948, p. 813-816. See item 17-68, 1948.

**17-98. High-Temperature Ceramic Materials.** A. L. Berger. *Technical Data Digest,* v. 13, Dec. 1, 1948, p. 13-18.

Properties and problems in connection with applications to aircraft power plants, jets, rockets, guided missiles, supersonic air foils. Research program of Air Materiel Command being conducted at five universities and colleges and two research institutes. Physical and chemical properties of high-melting ceramic and metal compositions.

**17-99. Fundamental Research For the Navy in Ceramics.** R. D. Jackel. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 552-564.

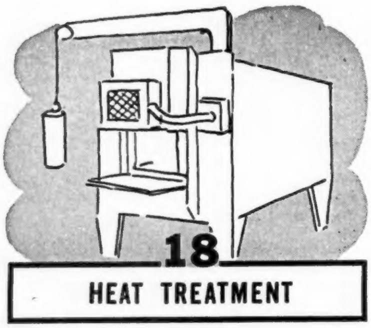
Work on the phase relationships of metal-ceramic combinations.

**17-100. Pure Oxide Refractories Withstand High Temperatures.** O. J. Whittemore, Jr., *Materials & Methods,* v. 28, Dec. 1948, p. 79-81.

Properties and present and patented applications.

**For additional annotations indexed in other sections, see:**

27c-23.




**18a-26. Heat Transmission in Strip-Coil Annealing.** J. D. Keller. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 60-67; discussion, p. 67-70.

The important factor is conduction through the film and not radiation or metallic contact as is usually assumed. Theoretical analysis of the problems involved.

**18a-27. Heat Treating Used to Vary Properties of Precision Cast Materials.** Edwin Laird Cady. *Materials & Methods,* v. 28, Dec. 1948, p. 72-75.

How a range of properties can be provided with a minimum number of alloys by heat treatment of aluminum, beryllium copper, stainless steels, and toolsteels.

## 18b—Ferrous

**18b-154. Heat Treating Parts for Apex Appliances.** *Industrial Heating,* v. 15, Nov. 1948, p. 1908, 1910, 1912, 1914, 1916.

Equipment and procedures.

**18b-155. Deep Freezing of Small Tools.** Henry L. Wainwright. *Machinery* (London), v. 73, Nov. 4, 1948, p. 643-644.

Effects of cold treatment at −83° C. on drills, reamers, cutters, and hobs. Performance has been improved by 100 to 500%.

**18b-156. Heat Treating Stainless Steel by Salt Bath.** L. Sanderson. *British Steelmaker,* v. 14, Nov. 1948, p. 518-519.

New method in which the welding flux is eliminated at lower cost, and the annealing more cheaply and quickly effected.

**18b-157. Take Care of Small Castings.** H. B. Gilson. *Welding Journal,* v. 27, Nov. 1948, p. 955.

How to make an annealing bin from an old storage tank.

**18b-158. Heat Treatment of Precision Bearings at SKF.** A. L. Neudoerffer. *Industrial Gas,* v. 27, Nov. 1948, p. 5-7, 27-29.

**18b-159. High Speed Flame Hardening Speeds Chain Production.** Arthur Q. Smith. *Industrial Gas,* v. 27, Nov. 1948, p. 8-9.

**18b-160. Improved Silicon-Iron for Electrical Equipment.** Weston Morrill. *Metal Progress,* v. 54, Nov. 1948, p. 675-678.

Results of a 15-yr. study of means whereby large crystals can be made to grow in transformer sheet, at will, with axes pointed in a uniform direction. Controlled-atmosphere heat treatment is the principal factor involved.

**18b-161. Practical Aspects of Isothermal Annealing.** J. Shaw. *Steel Processing,* v. 34, Nov. 1948, p. 600-604, 613.

Previously abstracted from *Iron and Steel,* v. 21, Sept. 1948, p. 391-396; Oct. 1948, p. 443-445. See items 18b-146 and 18b-150, 1948.

**18b-162. High-Frequency Induction Hardening of Lathe Bed Ways.** George H. DeGroat. *Machinery,* v. 55, Dec. 1948, p. 160-163.

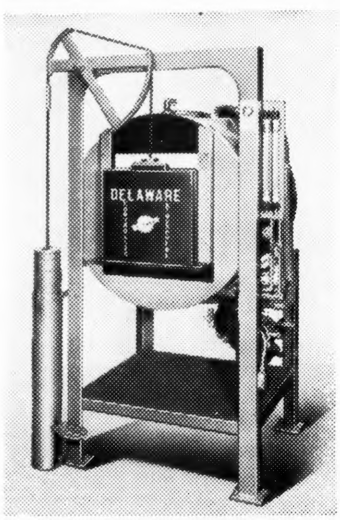
Application of induction heating that demonstrates value of the process for hardening long parts with a minimum of distortion.

**18b-163. Etappglödgning i kvalitetsstaltillverkning.** (Cyclic Annealing in Production of High-Quality Steel.) Erik Tholander. *Jernkontorets Annaler,* v. 132, No. 10, 1948, p. 367-431; discussion, p. 431-446.

Utilization of the isothermal transformation of austenite after hot working of steel. It was concluded that rapid isothermal transformation to a pearlitic structure having good machinability is possible for most of the common oil or air-hardening alloy steels. 11 ref.

**18b-164. High-Frequency Induction Hardening; The Effect of Prior Structure on Carbide Solution Under Extremely Rapid Heating Rates.** R. J.





Brown. *Journal of the Iron and Steel Institute,* v. 160, Nov. 1948, p. 241-245.

The effect of extremely rapid heating rates upon the structure of the surface layers of 0.35 to 0.40% carbon steel and Mn-Mo steel of similar carbon content, and the effect of the prior condition of the steel in relation to carbide solution and homogenization of carbon distribution in the final structure.

**18b-165. Isothermal Heat-Treatment for Precision Hardening.** C. T. Wilshaw. *Metallurgia,* v. 39, Nov. 1948, p. 3-6.

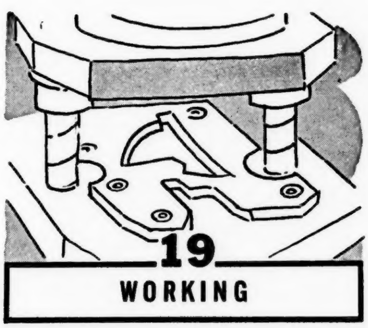
Use of the isothermal-transformation diagram in isothermal hardening or martempering. Limitations are indicated; and the discussion of the practical aspects includes a description of an existing plant.

**18b-166. Structural Changes During Continuous Cooling.** Carl A. Liedholm. *Metal Progress,* v. 54, Dec. 1948, p. 849-856.

Information shown on continuous-cooling diagrams and data obtained from flat Jominy bars can be used to advantage in planning practical heat treatments. Recommends extension of such data to include slower cooling rates than heretofore.

**For additional annotations indexed in other sections, see:**

2a-24; 3b-188-196; 12b-82; 16b-110-115; 19b-162-166; 22b-360; 27c-24.




## 19a—General

**19a-236. Volume and Flexibility Feature Chevrolet's Axle Housing Job.** P. D. Aird. *Modern Industrial Press,* v. 10, Nov. 1948, p. 13-14, 16, 20.

Press and other operations.

**19a-237. Designing of "Trouble-Free" Dies. Part LXXXVII. High-Speed Presses.** C. W. Hinman. *Modern Industrial Press,* v. 10, Nov. 1948, p. 18, 20.

Multi-slide machines and hypermatic high-speed presses.

**19a-238. Unusual Press Production Proves Its Worth at Kenworth Motor Truck Corporation.** Howard E. Jackson. *Modern Industrial Press,* v. 10, Nov. 1948, p. 22, 24, 26, 46.

Press operations, forming-die production, and welding operations.

**19a-239. Presses Important in the Development of Novel, Small Metal and Plastic Products.** Walter Rudolph. *Modern Industrial Press,* v. 10, Nov. 1948, p. 32, 36, 38.

**19a-240. Presses Speed Production of Electric Power Drives.** Fred. M. Burt. *Modern Industrial Press,* v. 10, Nov. 1948, p. 40, 42, 44.

Layout, equipment, and procedures. Welding and die-casting operations.

**19a-241. Another Easy Job for Your Blowpipe.** I. Kurzinski. *Welding Journal,* v. 27, Nov. 1948, p. 955-956.

Use for bending, straightening, and forming.

**19a-242. Punch Jig With Full Positioning Control.** *Sheet Metal Worker,* v. 39, Nov. 1948, p. 37.

Equipment for processing cold-rolled steel and other metals.

**19a-243. Press Brake for Gang Punching.** *Sheet Metal Worker,* v. 39, Nov. 1948, p. 47.

Equipment and applications.

**19a-244. One-Stage Super-Depth Drawing.** Bill Edwarus. *Western Metals,* v. 6, Nov. 1948, p. 32.

Drawing of aluminum, steel, and brass to depths up to 9 in. in one-stage die operations without excessive work hardening or defects. These draws are said to be made possible by use of a new type petroleum-base lubricant, composition of which is a secret.

**19a-245. Small Ferrule and Clip Forming Tool.** J. C. Murgatroyd. *Machinery* (London), v. 73, Nov. 4, 1948, p. 642.

**19a-246. Die Setting and Economical Punch Press Operation.** E. H. Girardot. *Iron Age,* v. 162, Nov. 18, 1948, p. 94-98.

Some "Do's" and "Don'ts" for the die setter and a program for training die setters.

**19a-247. Roll Neck Seals; Their Development and Application.** F. E. Payne. *Steel,* v. 123, Nov. 29, 1948, p. 92, 94, 98, 102.

Sealing in the vertical plane with an end-face positive seal which results in increased roll life, longer bearing life, no loss of lubricant, elimination of strip straining, and cleaner and safer mills.

**19a-248. Some Fundamental Considerations of the Deep Drawing of Metals. Part II.** (Concluded.) A. R. E. Singer. *Steel Processing,* v. 34, Nov. 1948, p. 595-597.

Different types of frictional conditions existing between metal surfaces and their fundamental relationship to deep drawing. The problem of lubricant development for deep drawing, the fundamental properties peculiar to particular metals, and application of the results of fundamental research to production problems.

**19a-249. A Method of Ensuring Clearance for Slug Disposal in Press Operations.** P. E. Crome. *Machinery* (London), Nov. 11, 1948, p. 672.

**19a-250. Movable Units Punch Four Internal Flanges.** *Product Engineering,* v. 19, Dec. 1948, p. 100.

Unit for punching holes in refrigerator-door stampings.

**19a-251. Punch and Die Construction Practices; Standardization in Die Construction.** Federico Strasser. *Tool & Die Journal,* v. 14, Dec. 1948, p. 59-60, 62-64.

**19a-252. Improved Forming Technique at Northrop.** T. E. Piper and Al Schoellerman. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 40-43, 78.

How practical reduction in bend radii is achieved by a new punch design, which has a flat spot on its nose.

**19a-253. Contribution a l'etude des laminoirs a bandes.** (Contribution to the Study of Continuous Strip Rolling Mills.) Paul Blain. *Revue de Métallurgie,* v. 45, Aug. 1948, p. 241-248.

A comprehensive study of existing types of rolling mills, with emphasis on the continuous strip type.

**19a-254. A New Theory of the Plastic Deformation in Wire-Drawing. Part I.** R. Hill and S. J. Tupper. *Wire Industry,* v. 15, Nov. 1948, p. 739-741.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, Aug. 1948, p. 353-359. (To be continued.) See item 19a-195, 1948.

**19a-255. Die for Forming Eight Right-Angle Bends in One Press Stroke.** *Machinery* (London), v. 73, Nov. 18, 1948, p. 707-708.

**19a-256. Dies for Drawing Operations. VII.** J. W. Lengbridge. *Tool Engineer,* v. 21, Dec. 1948, p. 34-37.

Various types of equipment used for metal drawing.

## 19b—Ferrous

**19b-151. La fabrication des tubes metalliques sans soudure.** (Fabrication of Metal Tubes Without Welding.) R. Stettler. *Pro-Metal,* v. 3, May 1948, p. 84-95.

Swiss methods.

**19b-152. Cold Reduced Sheet and Tin Plate Plant Increases Output of Columbia Steel by More Than 300,000 Tons.** *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1325-1331.

**19b-153. The Electrification of the Cold Reduction Mill of the Columbia Steel Mill.** F. R. Grant. *Blast Furnace and Steel Plant,* v. 36, Nov. 1948, p. 1347-1354.

**19b-154. The Uni-Temper Mill.** A. I. Nussbaum. *British Steelmaker,* v. 14, Nov. 1948, p. 503-508.

Details of this type of mill and its advantages. It was first put into commercial use in the U. S. in 1944.

**19b-155. "Watch The Fords Go By"—With Western Mouldings.** *Western Metals,* v. 6, Nov. 1948, p. 19.

Production of rolled metal mouldings and stampings for Ford automobiles.

**19b-156. Mass Production of Steel Reinforcing Units.** Newell Farrar. *Western Metals,* v. 6, Nov. 1948, p. 20-21.

Forming and welding in fabrication of cage-like units ready for placement in forms prior to pouring of concrete.

**19b-157. Wear Resistance of Wire for Wire Rope.** Reginald S. Brown. *Wire and Wire Products,* v. 23, Nov. 1948, p. 1037-1047, 1061-1062.

Reliable method developed for determining the surface-flow characteristics of patented steel wires. Results indicate large differences in the behavior of wires produced by different methods. Effects of composition, patenting method, and amount of cold work.

**19b-158. New Cold Mill at Weirton Increases Tin Plate Capacity.** C. J. Klein. *Iron and Steel Engineer,* v. 25, Nov. 1948, p. 37-48; discussion, p. 48.

**19b-159. Spun Stainless Venturi.** Leslie F. Hawes. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 109.

The venturi is made from two disks, 9 and 11 in. in diameter, and is welded after forming.

**19b-160. Western Cold Rolled Steel.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 122.

New cold-reduction sheet and tin-plate mill.

**19b-161. Stamping Buick Bumper Guards.** Herbert Chase. *Iron Age,* v. 162, Nov. 25, 1948, p. 90-91.

Four men operate five presses that draw, form, and trim bumper guards. Studs are then welded to the inside of the guard in a fast-moving, wheeled fixture arrangement. The production-line setup.

**19b-162. Production of Drop-Forged Crankshafts for Use in High-Compression Engines.** H. A. Whiteley. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 133-137, 141.

British methods and equipment, including inspection and heat treatment.

**19b-163. Fundamentals of Forging Practice. XIII and XIV.** Waldemar Naujoks. (Concluded.) *Steel,* v. 123, Nov. 22, 1948, p. 56-71, 110; Dec. 6, 1948, p. 121-122, 124, 127, 158, 160, 162.

Nov. 22 installment reviews design characteristics of forging ma-

chine and press forgings, heat treating considerations, and amount of metal to be allowed for subsequent machining operations. Final installment consists of a dictionary of terms commonly used in the forging industry.

**19b-164. New High-Speed Rod Mill Utilizes Electronic Speed Regulation.** G. M. Harvey and D. M. Allison. *Steel,* v. 123, Dec. 6, 1948, p. 134, 136, 138.
System as applied by Laclede Steel Co.

**19b-165. Rolling Raised Steel Type Characters.** Herbert Chase. *Iron Age,* v. 162, Dec. 9, 1948, p. 111-114.
How round steel blanks, set in holder on a floating spindle of a milling machine, are rolled against engraved type-character dies, yielding clean, sharp, type characters of accurate dimensions for business machines. Manufacturing setup, die construction, and other details.

**19b-166. Coil Spring Production Boosted to 650 Per Hour.** *Steel,* v. 123, Dec. 13, 1948, p. 87.
Forming and heat treating operations.

**19b-167. Wiredrawing? Shucks—There Ain't no Such Animal.** *Mainspring,* v. 12, Dec. 1948, p. 1-4.
An "intelligent mechanic" tells why wire drawing of steel is impossible, from the fundamental point of view. It is then shown that the mechanic is right except that he neglected the effect of the protective coating of hydrated lime, known as "sull". How this and other pretreatments were developed.

### 19c—Nonferrous

**19c-28. Production of Bronze Wire From Centrifugally Cast Plate.** *Machinery* (London), v. 73, Nov. 4, 1948, p. 639. Based on B.I.O.S. Report No. 1797.
German method.

**19c-29. Nameplates — Forming and Porcelain Enameling.** Sam A. Higginbottom. *Ceramic Industry,* v. 51, Dec. 1948, p. 66-67.

**19c-30. Les procédés de fabrication des usines métallurgiques Suisses. Le filage des tubes et des barres.** (Fabrication Processes in the Swiss Metallurgical Industry. Tube and Extrusion Presses. (Also in German.) O. H. C. Messner. *Pro-Metal,* v. 1, July 1948, p. 108-115.
Particular reference to copper and copper alloys. (To be continued.)

**19c-31. Mechanical Working of Tantalum.** Rupert H. Myers. *Metallurgia,* v. 39, Nov. 1948, p. 7-10.
Techniques for swaging, rolling, and wire-drawing the metal, with particular reference to the problem of lubrication in drawing. The effect of cold-working on density and a method of spot-welding it to itself and to other metals.

### 19d—Light Metals

**19d-60. Fifty-Ton Stretch.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 112-113.
New machine designed to stretch-form aluminum sheet stock in sizes up to 42 in. wide by 12 ft. long.

**19d-61. Hot Forming Magnesium Sheet.** E. F. Stoner and Crosby Harden. *Iron Age,* v. 162, Nov. 18, 1948, p. 109-112.
Results of investigations of various methods, with particular emphasis on forming limitations, methods of heating, and heat ranges. Chief conclusion reported is that hot drop hammering and stretch press forming offer distinct production advantages.

**19d-62. Europe Tools for Extrusion.** John Everhart. *American Machinist,* v. 92, Dec. 2, 1948, p. 67-69.
Tools for the extrusion of aluminum cans. Commercial methods used abroad.

**19d-63. High Speed Photos Reveal Extrusion Rate Phenomenon.** R. M. Phillips. *Iron Age,* v. 162, Dec. 2, 1948, p. 102-103.
Reveal a nonuniform slowing of the extrusion rate. Describes the phenomenon and suggests that it is due to elastic effects in the press operating in conjunction with the expected harmonic motion imparted by the crank.

**19d-64. Electrification of a Hot Rolling Mill.** *Light Metals,* v. 11, Nov. 1948, p. 604-608.
Equipment installed by General Electric Co., Ltd., with particular reference to the special requirements of hot rolling mills for light alloys.

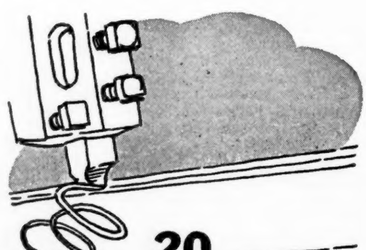
**19d-65. Electro-Hydraulic Controls Combined in Stretch Forming Machine.** J. A. Helget. *Electrical Manufacturing,* v. 42, Dec. 1948, p. 86-89, 188.
How three independent motor-driven hydraulic systems, governed by push buttons, interlocking relays, solenoid and manual valves, produce directionally controlled tension in aluminum sheet, then wrap it around a forming die.

**19d-66. Extruded Aluminum Propeller Blades and Hub.** Walter H. Korff. *Product Engineering,* v. 19, Dec. 1948, p. 127.
Described and illustrated. Cost advantages.

**19d-67. 60,000-Ton Forging Press Would Revolutionize Aircraft Manufacture.** *Steel,* v. 123, Dec. 13, 1948, p. 112.
The largest press in the U. S. has a capacity of 18,000 tons. The Germans had a 30,000-ton press used in an attempt to obtain maximum tensile properties from Mg and Al-alloy ingots. The possible construction of a 60,000-ton press. Potential cost and time savings.

**19d-68. Hot-Pressing and Hot-Forging Light Alloys.** M. Chartron. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 397-398. Translated and condensed from *Revue de l'Aluminium,* v. 25, No. 141 and 143, p. 37-43; 113-122.
Previously abstracted from original source. (To be continued.) See items 19d-21 and 19d-32, 1948.

**For additional annotations indexed in other sections, see:**
**3a-140; 3b-196; 12b-81; 20a-453; 21b-84; 27c-24.**



## 20 MACHINING and MACHINABILITY

### 20a—General

**20a-434. New Principle for Tough Cuts.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 110-111.
Tyler band saw and its application to the production cutting of intricate designs in sheet metal. The spiral bandsaw blade has a continuous cutting edge no matter from which direction the work approaches it.

**20a-435. Synthetic Sapphires Provide High Finish for Machine Parts.** N. Bruce Bagger. *Materials & Methods,* v. 28, Nov. 1948, p. 79.
Use as wearing, bearing, or cutting materials.

**20a-436. Master Turbine-Impellers.** *Aircraft Production,* v. 10, Nov. 1948, p. 363-364.
Production of patterns for profile copying of impeller vanes.

**20a-437. Machine Set-Ups Demonstrated at Olympia.** *Machinery* (London), v. 73, Nov. 4, 1948, p. 631-637.
Details of some of the set-ups on single-spindle automatics demonstrated at show, together with information concerning demonstrations on other types of machine tools.

**20a-438. Broaching Pinion Cage Slots.** *Iron Age,* v. 162, Nov. 25, 1948, p. 88.
How to rapidly machine a number of large slots in pinion cages, holding slot faces to within 0.001 in. of parallel with faces of the pinion cages.

**20a-439. Master Bases Cut Fixture Costs.** Herman Goldberg. *American Machinist,* v. 92, Dec. 2, 1948, p. 83-90.
Use of standard master bases upon which a wide variety of jigs can be created. These are obtainable in both cam-lock and air-operated models, vertical or horizontal indexing, upward or downward clamping, horizontal clamping, or vise-type.

**20a-440. Simplified Machining Produces Complicated Parts.** Stone E. Eklund and Aaron H. Shum. *American Machinist,* v. 92, Dec. 2, 1948, p. 96-99.
Use of electrical follower attachments on standard machines simplifies machining operations on compound-angle surfaces.

**20a-441. Talented Tooling.** *American Machinist,* v. 92, Dec. 2, 1948, p. 100-101.
Manufacturing lathes turn precision steel housing, gear housings bored on angle-plate setup, and free ring controls depth of hand-miller chamfer.

**20a-442. Practical Ideas.** *American Machinist,* v. 92, Dec. 2, 1948, p. 102-106.
Includes the following: adjustable grinding wheel segments maintain constant diameter in grinding face cams (G. R. Milner); use of three equal-diameter disks for angle layout (S. Framurz); boring-mill fixture sets-up die inserts for arc cut; continuous spinning of 10-qt. pans—loading and unloading while lathe is running at full speed (Rex May, Jr.); aligning fixture for locating milling spindles directly over shaft centers (Ernest F. Abel); use of vernier caliper to measure radii of partial sections (Clifford T. Bower); discussion of adapter method suggested by Charles Shope for measuring thread diameters (Carl A. Johnson); slotting as a substitute for broaching in the end of boring bars (Roger Isetts); and other miscellaneous shop hints.

**20a-443. Holders for Dovetail Forming Tools.** *American Machinist,* v. 92, Dec. 2, 1948, p. 119.

**20a-444. Blanks for Dovetail Forming Tools.** *American Machinist,* v. 92, Dec. 2, 1948, p. 121.

**20a-445. The Application of Electronics to Machine Tools.** *Machinery* (London,) Nov. 11, 1948, p. 663-668.
Some examples displayed at recent British show.

**20a-446. Manufacture of Braid Machine Spools.** A. Schofield. *Machinery* (London), Nov. 11, 1948, p. 668.
Machining setup.

**20a-447. Making Photographic Film Reels.** *Machinery* (London), Nov. 11, 1948, p. 669-672.
Methods used by Kodak, Ltd., for one of the several types required.

**20a-448. A Work Driver for Lathes.** *Engineer,* v. 186, Nov. 12, 1948, p. 500.
Device for gripping and driving centered rough round blanks or turned parts on lathes.

**20a-449. Grinding Fine-Pitch Gears.** A. S. Beam. *Machinery,* v. 55, Dec. 1948, p. 156-159.
Two principal methods: form grinding and generation by grinding, their distinguishing limitations, and characteristics. Grinding gears of toolsteel, mild steel, stainless steel, iron, aluminum, bronze, brass, Micarta, and other compounded materials.

**20a-450. Cutting Sprockets for Silent Chain Drives With One Pair of Cutters.** J. L. Jessup. *Machinery,* v. 55, Dec. 1948, p. 166-168.
Details of development of cutter design, including table of data necessary for constructing a cutter to machine sprockets having 13-125 teeth and a pitch of 3/8-0.9 in. The data are intended for use on emergency jobs only, not for mass production.

**20a-451. How to Specify Magnetic Chucks.** Charles D. Briggs. *Machinery,* v. 55, Dec. 1948, p. 171-174.
Construction, operation, and application of the principal types.

**20a-452. Cleaning System Speeds Output of Precision-Built Racing Motors.** H. R. Kingsley. *Machinery,* v. 55, Dec. 1948, p. 182-183.
Equipment and methods for cleaning precision-built parts after machining.

**20a-453. Tool Engineering Ideas.** *Machinery,* v. 55, Dec. 1948, p. 189-192.
Fixture Designed for Radial and Axial Location, F. Server; Sawing Attachment for Cutting off Wedge-Shaped Washers on B & S Automatic, John J. McNeff; and Progressive Die for Producing Two Parts of Similar Design, Federico Strasser.

**20a-454. Effects of Cutting Fluids and Power Requirements in Metal Cutting Operations.** A. O. Schmidt and G. V. B. Sirotkin. *Lubrication Engineering,* v. 4, Dec. 1948, p. 261-265; discussion, p. 265.
Method and apparatus used to determine the effects of a series of cutting fluids during drilling and milling of steel. A calorimetric method was used to determine the amount of heat generated.

**20a-455. "How Would You Tool This Part.** H. C. Tsien. *Tool & Die Journal,* v. 14, Dec. 1948, p. 42-45, 70.
Detailed description and drawings of tooling for machining piece known as "stud for clutch lever". Project calls for machining two parts, both having one end eccentric to the other.

**20a-456. Construction and Operation of a 3-Spindle Automatic Lathe.** E. P. Bullard, III. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 115-120, 122.

**20a-457. Automatic Loading Devices for Gear Finishing.** *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 177-180.
Devices made to suit different production requirements.

**20a-458. Jig for Accurate Part Duplication.** Robert Mawson. *Iron Age,* v. 162, Dec. 9, 1948, p. 102-104.
Jig designed for accurate location and positive holding in drilling of milling-machine motor-plate keys.

**20a-459. Trepan Boring of Deep Holes.** W. Iwascheff and E. Schönberg. *Machinery* (London), v. 73, Nov. 18, 1948, p. 701-702.
The difficulties associated with the drilling of deep holes by conventional means led to investigation of the possibilities of trepan-boring, whereby an annular cut is taken leaving a solid core which is finally removed intact. Method and equipment.

**20a-460. Toolholder With Spring Support.** *Machinery* (London), v. 73, Nov. 18, 1948, p. 702. Translated from *Techn. Rundschau,* Feb. 5, 1948.

**20a-461. High-Production Rolling of Precision Threads.** *Machinery* (London), v. 73, Nov. 18, 1948, p. 705-706.
New design of thread and form-rolling machine recently developed in the U. S. for production of fine, coarse, square, Acme, or ball-bearing type threads on plain carbon steel; high-carbon, high-Cr alloy steel; high speed steel; brass; aluminum; or bronze. In addition, knurling, burnishing, serrating, and other form-rolling operations can be done.

**20a-462. Fixture for Turning Split Bearings.** *Machinery* (London), v. 73, Nov. 18, 1948, p. 710. Translated from *Tech. Rundschau,* v. 4, July 30, 1948, p. 5.

**20a-463. Practical Problems of Machinability.** Chester M. Inman. *Metals Review,* v. 21, Dec. 1948, p. 41, 43, 45.
First portion of Lecture III on "The Working of Steel" is confined mainly to those variables in internal mechanical structures obtainable in steel, and variations in cutting angles, both of which combine to determine actual machining characteristics for a given operation.

**20a-464. The Crib.** *Production Engineering & Management,* v. 22, Dec. 1948, p. 73.
Device for Tapping Holes, W. M. Goodrich; Edge Locating Fixture, J. G. Betz; and Screw Machine Slotting, J. Harry Hill.

**20a-465. Air and Hydraulic Clamping for Jigs and Fixtures.** Harry L. Stewart. *Tool Engineer,* v. 21, Dec. 1948, p. 25-28.
Automatic clamping cuts costs and speeds production with reduced operator fatigue.

**20a-466. Piston Pin Hole Production.** A. Francis Townsend. *Tool Engineer,* v. 21, Dec. 1948, p. 29-30.
Improved method and equipment.

**20a-467. Internal Cooling of Grinding Wheels.** Alexander Maxwell. *Tool Engineer,* v. 21, Dec. 1948, p. 31.

**20a-468. Precision Boring Tool Design,** V. A. E. Rylander. *Tool Engineer,* v. 21, Dec. 1948, p. 38-39.
Deals with precision boring, such as finishing operations which require no further processing except possibly honing or lapping.

**20a-469. Gadgets.** *Tool Engineer,* v. 21, Dec. 1948, p. 40-41.
Automatic Two-Position Stop (for milling machine), E. H. Kinne; An Improved Cam Movement, Robert Mawson; and Emergency "Hard" Drill (uses hard-facing of ordinary drill), James Maltby.

**20a-470. Problems in Shaving Fine-Pitch Gears.** Louis D. Martin. *American Machinist,* v. 92, Dec. 16, 1948, p. 84-88.
Shaving of fine-pitch spur and helical gears. Materials range from toolsteel to nylon; jobs run the gamut of type and size.

**20a-471. A Handbook of Horizontal Broaching Fixtures.** Ben C. Brosheer. *American Machinist,* v. 92, Dec. 16, 1948, p. 93-108.
Typical equipment, procedures, and applications.

**20a-472. Radials Cut Boring Costs 24.3%.** *American Machinist,* v. 92, Dec. 16, 1948, p. 109-111.
Combined boring with drilling, tapping, and facing on four injection-molder parts. Other production jobs.

**20a-473. Practical Ideas.** *American Machinist,* v. 92, Dec. 16, 1948, p. 120-124.
Precision centering fixture for cylindrical grinding without a cylindrical grinder (Allan B. Nixon); wheel fixture gages tapers (H. Moore); ammeter load gage indicates machine-tool condition and safe load limit (Chandler A. Phillips); fixture for holding lamination assemblies during welding (T. E. Tyler); eccentric pins level work on cylinder grinder (Harold W. Cutting); carbide bit with four edges (Walter Dimitruk); midget vise for small die work (Clifford T. Bower); and other miscellaneous shop hints.

## 20b—Ferrous

**20b-100. Grinding** Reginald S. Bruce. *Edgar Allan News,* v. 27, Nov. 1948, p. 161-164.
Recommended procedures for grinding steel cutting tools.

**20b-101. Grinding Die Laminates.** *Western Machinery and Steel World,* v. 39. Nov. 1948, p. 105.
Grinding of high-chromium, high-carbon lamination dies for motor stators.

**20b-102. Machining Firefly Components.** J. A. Oates. *Aircraft Production,* v. 10, Nov. 1948, p. 380-387.
Operations on the latchpin attachment fitting for the rear center-section spar and other "difficult" units of British plane.

**20b-103. An Unusual Machining Operation on a Printing Cylinder.** *Machinery* (London), v. 73, Nov. 4, 1948, p. 638-639.
Set-up for milling curved ribs for printing of curved coordinates on recorder charts.

**20b-104. Threading at 2000 R.P.M. With Carbide Tipped Chasers.** S. T. Hicks. *Iron Age,* v. 162, Nov. 25, 1948, p. 80-82.
Threading of S.A.E. X1315 steel studs can be accomplished at machine spindle speeds of 2000 r.p.m. and cutting speeds of 400 s.f.p.m., eliminating the necessity of reducing machine speeds for threading operations.

**20b-105. How Harvester Makes Forging Dies.** C. R. Hoagland. *American Machinist,* v. 92, Dec. 2, 1948, p. 78-82.
Machining, welding, and other procedures.

**20b-106. Dodge Rolls Threads on Screw Machines.** Rupert LeGrand. *American Machinist,* v. 92, Dec. 2, 1948, p. 94-95.
How rolled stud fits are held to 0.002 in. on pitch diameter, as compared to 0.0034 in. for die-cut nut fits, and how the part is completed in one operation.

**20b-107. Machining Pilger-Type Tube Mill Rolls on a Special Craven Lathe.** *Machinery* (London), Nov. 11, 1948, p. 673-674.

**20b-108. Planing Cast Iron with Carbide Tools.** G. J. Raible. *Machinery* (London), Nov. 11, 1948, p. 675-676.

**20b-109. Production of Rock Bits at Reed Roller Bit Company.** Gerald Eldridge Stedman. *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 125-126, 128, 130-132, 134.

**20b-110. Huge Spherical Roller Bearings Made to Close Tolerances.** Charles H. Wick. *Machinery,* v. 55, Dec. 1948, p. 139-146.
Spherical roller bearings as large as 48 in. in diam. and weighing more than 5100 lb. are manufactured with toolroom precision.

**20b-111. High-Speed Boring and Turning Operations.** *Machinery,* v. 55, Dec. 1948, p. 146-147.
How 900 hydraulic tappet tubes

per hr. are machined externally and internally on a New Britain precision boring and turning machine equipped with magazines that automatically feed the workpieces to the two heads.

**20b-112. Oldsmobile's Modern Facilities for Production of 1949 V-8, Overhead-Valve Engine.** Joseph Geschelin. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 30-33, 76, 78.

**20b-113. Mill-Broach Speeds V-8 Engine Production.** *Iron Age,* v. 162, Dec. 9, 1948, p. 104-105.
New combination machine developed by Cincinnati Milling Machine Co.

**20b-114. Boiler Drilling and Tapping Performed by Portable Machine.** *Steel.* v. 123, Dec. 13, 1948, p. 103.

**20b-115. Broach Manufacture.** *Machinery* (London), v. 73, Nov. 18, 1948, p. 695-700.
Operations in the broach div. of B.S.A. Tools, Ltd.

**20b-116. How Large Gears Are Shaved.** George P. Maurer. *American Machinist,* v. 92, Dec. 16, 1948, p. 90-92.
Diameters and shaft lengths up to 96 in. can be handled on newer machines. Procedure and some problems.

## 20c—Nonferrous

**20c-15. Machining High Purity Molybdenum.** John Gelok. *Iron Age,* v. 162, Dec. 9, 1948, p. 106-110.
Because of its inherent characteristics, some unusual problems are faced in machining, forming, and joining molybdenum. Some recommended machining practices.

**20c-16. Some Factors in Carbide Die Construction.** *Tool Engineer,* v. 21, Dec. 1948, p. 30.
Discussion is concerned primarily with the four general steps in the construction of carbide dies, and is based on the building of a simple draw die for the first operation in a deep draw job.

**20c-17. Proper Processing Increases Efficiency of Carbide Dies.** Paul F. Rehner. *Production Engineering & Management,* v. 22, Dec. 1948, p. 67-69.
Procedures, established by research conducted by Allegheny Ludlum, which provide a guide for obtaining improved results from carbide dies.

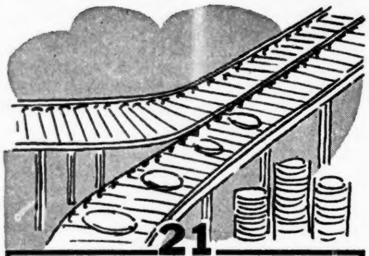
## 20d—Light Metals

**20d-23. Machining Aluminum.** *Reynolds Metals Technical Advisor,* v. 1, no. 9, [1948], p. 3-4.
Section I of new series from Reynolds process manual, "Machining Aluminum Alloys". Fundamentals involved. (To be continued.)

**For additional annotations indexed in other sections, see:**
**14c-63; 24b-116; 27a-161-162.**








# MISCELLANEOUS FABRICATION

## 21a—General

**21a-153. Involute Spline Experience.** Charles H. Stanard. *American Society of Mechanical Engineers, Advance Paper* No. 48-SA-20, 1948, 7 pages.
Manufacture and functioning of splines in the automotive industry. Various methods of production.

**21a-154. Salvo by Douglas; El Segundo.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 82-85.
Miscellaneous production methods and equipment used in military-plane production by Douglas at its El Segundo plant.

**21a-155. Lockheed Machinery and Aviation.** E. H. Farmer. *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 86-89, 124.

**21a-156. North American's World Champion.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 90-91.
Procedures and equipment in production of the F-86 and B-45.

**21a-157. Exacting Tests at Northrop.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 92-93.
Production and structural testing of four specialized military planes.

**21a-158. New Travel Era by Convair-Liners.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 94-96.
Production facilities.

**21a-159. Boeing Builds Them Big.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 97-99.
Boeing planes and production facilities.

**21a-160. Ryan's Navions.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 100-101.
Production of personal plane.

**21a-161. Springs for Western-Built Freight Cars.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 118-119.
Production of above and also other types of leaf and coil springs down to very small ones.

**21a-162. Hawker Sea Fury. Part II. Front Fuselage Assembly; Rear Fuselage; Tail-Bay With Integral Fin.** S. C. Poulsen. *Aircraft Production,* v. 10, Nov. 1948, p. 366-374.
Production and assembly of above components of British plane. (To be concluded.)

**21a-163. Streamlined Production; International Harvester Company, Louisville, Kentucky.** *Production Engineering & Management,* v. 22, Dec. 1948, p. 59-66.
Equipment and procedures for production of farm tractors.

**21a-164. Liquid Nitrogen Simplifies Bearing Assembly.** R. E. Bludeau. *American Machinist,* v. 92, Dec. 16, 1948, p. 82-83.
How interference fits of 0.017 in. are reduced to 0.012-in. clearance by cooling the bearing ring in liquid nitrogen in a simple container.

## 21b—Ferrous

**21b-83. Solar Handles Heat.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 102-104.
Fabrication of manifolds and heat resistant cowells, shrouds, muffs, heat exchangers and other related items for various types of planes and heat resistant units for gas turbines and jet engines.

**21b-84. Hydro-Press Engineered at Home.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 106-108.
How small manufacturer of airplane parts and sheetmetal products designed and built a 750-ton press for use in their plant, when they were unable to purchase this piece of equipment.

**21b-85. Shipbuilder in General Manufacturing.** *Western Machinery and Steel World,* v. 39, Nov. 1948, p. 114-117.
General manufacturing activities in United Engineering Co.'s San Francisco shops since shipbuilding activities came to a halt last spring. Miscellaneous special machinery is being produced for several industries.

**21b-86. New Developments in Hot Dipped Tin Plate Production.** *Industrial Heating,* v. 15, Nov. 1948, p. 1940, 1942, 1944. Condensed from paper by E. F. Harris.
Modern handling methods for tin-plate production.

**21b-87. Irvin Works Modernization Program Effects Improved Product Quality and Processing Efficiency.** *Steel,* v. 123, Nov. 22, 1948, p. 84-86.
Modernized facilities which make possible production of sheet steel in coil form up to the final operation of shearing to size at Irvin Work of Carnegie-Illinois Steel Corp. Additional slab-heating furnace; shearing equipment; 56-in. continuous pickler; sheet-coil annealing furnaces; and materials-handling equipment.

**21b-88. Hotpoint Streamlines Production at Huge Chicago Plant.** *Stove Builder,* v. 13, Dec. 1948, p. 46-53.
Picture story of the production of electric ranges. Press operations, materials handling, enameling, drying, and assembly.

## 21c—Nonferrous

**21c-11. Les procédés de fabrication des usines métallurgiques Suisses.** (Fabrication Procedures in the Swiss Metallurgical Industry.) (Also in German.) O. H. C. Messner, *Pro-Metal,* v. 1, March 1948, p. 26-31.
Describes the above and their relationships, especially for copper alloys.

**21c-12. Carbide Die Construction Accelerated by Widespread Interest in Processes for Fabricating Alloy Steels** *Steel,* v. 123, Dec. 6, 1948, p. 115, 157.
Recommended procedures for the four steps usually considered, illustrated by construction of a simple draw die for the first draw operation in a deep draw job. The four steps are: carbide and proper support; diamond boring; grinding; and lapping.

**21c-13. New Tooling Speeds Output of Improved Fire Extinguishers.** H. H. Messenger. *Production Engineering & Management,* v. 22, Dec. 1948, p. 51-54.
Miscellaneous operations in their production. Copper is the material used.


## 22a—General

**22a-242. Inert Gas Welding: The Aircomatic Process.** J. S. Sohn and A. N. Kugler. *Western Metals,* v. 6, Nov. 1948, p. 28-30. A condensation.
Process, uses an automatic "gun".

**22a-243. Trends in Resistance Welding Here and Abroad.** F. R. Hensel and E. F. Holt. *Welding Journal,* v. 27, Nov. 1948, p. 903-912.

**22a-244. The Gas Shielded Metal Arc-Welding Process.** Jesse S. Sohn and A. N. Kugler. *Welding Journal,* v. 27, Nov. 1948, p. 913-915.
New development.

**22a-245. The Stability of Oxyacetylene Flames.** Lewis D. Conta. *Welding Journal,* v. 27, Nov. 1948, p. 921-928.
The combustion of oxy-acetylene mixtures, covering such topics as normal flame propagation, flame velocities, detonation waves, and flame characteristics; followed by discussion of stability and control of backfire and flashback.

**22a-246. New Joining Process Brings Automatic Welding to Hand Tool.** *Steel,* v. 123, Nov. 29, 1948, p. 86.
Welding device and system used in Aircomatic, gas-shielded, metal-arc method.

**22a-247. 48,000 Welds an Hour.** *Iron Age,* v. 162, Dec. 2, 1948, p. 113.
Three-station, multipoint spot welder automatically inserts, positions, and welds to an elliptically-shaped muffler body, a baffle assembly consisting of six different components.

**22a-248. Flame Hardening—Principles, Applications, and Equipment.** M. S. Rosengren. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 718-726. Reprinted from *Welding Journal,* v. 27, June 1948, p. 453-455.

**22a-249. The Russian School of Thought in the Development of Electric Arc Welding.** (In Russian.) V. I. Nikitin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 809-821.
83 references.

**22a-250. Report From Paris; Congres International des Fabrications Mecaniques.** *Welding,* v. 16, Nov. 1948, p. 481-484.
One section of this congress was devoted to the application of welding in machine construction and the development of welding processes. Summarizes outstanding features and welding papers given.

**22a-251. Resistance Welding in Mass Production; Resistance Welding Costs.** A. J. Hipperson and T. Watson. *Welding,* v. 16, Nov. 1948, p. 486-491.
Economic factors. Average figures for different classes of work.

**22a-252. British Welding Prospects.** J. H. Paterson. *Chemical Age,* v. 59, Nov. 6, 1948, p. 625-626.
Effects of new technology and cost factors.

**22a-253. Inert-Arc Welding of Hard-to-Weld Metals.** M. J. Conway. *Machinery,* v. 55, Dec. 1948, p. 148-154.
Amount and kind of inert gas, type of polarity and current, and welding circuits best suited for joining such hard-to-weld metals as stainless steel, aluminum, and magnesium.

**22a-254. Jigging for Better Welds.** Phil Glanzer. *Welding Engineer,* v. 33, Dec. 1948, p. 44-48.
Principles of welding-jig design.

**22a-255. Inert-Arc Welding (Using A.C. High-Frequency Equipment).** *Welding Engineer,* v. 33, Dec. 1948, p. 67.
Recommended procedures for aluminum, magnesium (M-1 alloy), and stainless steel.

**22a-256. Factors Involved in Design of Welded Sheet Metal Joints for Production Assembly.** Robert E. Allen. *Automotive Industries,* v. 99, Dec. 1, 1948, p. 46-47. A condensation.
Illustrates factors by description of some examples in automotive body design.

**22a-257. Are Your Welding Costs Too High? Part II.** J. R. Stitt. *Industry and Welding,* v. 21, Dec. 1948, p. 26-30, 63-64, 78-79.
Factors which largely determine the quality of welding and the cost of the finished weldment.

**22a-258. Here's Something New in Spot Welding.** F. J. Pilia. *Industry and Welding,* v. 21, Dec. 1948, p. 32, 34, 36, 38.
Inert-gas shielded-arc spot welding. The weld is produced by heat from an electric arc applied to the top surface of two lapped pieces.

Welding action is controlled by current input and time.

**22a-259. Production Processes—Their Influence On Design. Part XXXIX. Seam Welding.** Roger W. Bolz. *Machine Design,* v. 20, Dec. 1948, p. 115-121.

Design for seam welding, the process itself, and its applications.

**22a-260. Metal Joining With Paste Type Fusion Alloys.** D. C. Dilley. *Machine Design,* v. 20, Dec. 1948, p. 146-148.

Paste alloys, known as Micro-Film alloys, which can be used for joining parts of aluminum, stainless steels, carbon and alloy steels, coppers, silver, brasses, tin, die-cast alloys, and carbides. Typical methods of application.

**22a-261. New Joining Process Makes Possible "One Side" Spot Welds.** F. J. Pilia. *Steel,* v. 123, Dec. 13, 1948, p. 84-86, 118, 121-122.

Previously abstracted from *Industry and Welding,* v. 21, Dec. 1948, p. 32, 34, 36, 38. See item 22a-258, 1948.

**22a-262. Developments in Metal Stitching.** A. E. Rylander. *Tool Engineer,* v. 21, Dec. 1948, p. 32-33.

Typical applications. With special machines, the method may be applied to assembly of metallic components made up of steel, aluminum, wood, leather, rubber, plastics, and other materials as well as their combinations.

**22a-263. Welding Fixtures for Arc-Welded Equipment.** Harold H. Hicks. *Welding Journal,* v. 27, Dec. 1948, p. 1024-1028.

Methods and procedures for the mass production of welded equipment and essential factors in creating fixtures.

**22a-264. Welding Research Problems.** *Welding Journal,* v. 27, Dec. 1948, p. 569s-576s.

Fundamental and practical problems on which research is believed desirable by the Welding Research Council are outlined under the general headings of: general physics and electricity; chemistry and physical chemistry; metallurgy; mechanical and testing; and structural studies.

**22a-265. Electrodes and Metals.** A. S. Tuttle. *Canadian Metals & Metallurgical Industries,* v. 11, Dec. 1948, p. 25, 29-31.

Importance of electrodes in arc welding—their development, standardization, and nomenclature.

## 22b—Ferrous

**22b-348. Welding in Engineering Production.** J. R. Ferguson. *Transactions of the Institute of Welding,* v. 2, Oct. 1948, p. 170-176; discussion, p. 177-180. A condensation.

Work ranging from one to 15 tons weight as well as examples of light work under 1000 lbs. Resistance, projection, and stud welding.

**22b-349. Lessons From Structural Failures of Welded Ships.** *Transactions of the Institute of Welding,* v. 2, Oct. 1948, p. 181-188.

Transcript of discussion at a meeting of the North-East (Tyne-Side) Branch of the Institute of Welding, Newcastle, England, Jan. 15, 1948.

**22b-350. Recommended Practice for the Spot Welding of Low Carbon Mild Steel Sheet.** *Welding Research* (Bound with *Transactions of the Institute of Welding),* v. 2, Oct. 1948, p. 83r-86r.

A committee report.

**22b-351. Automatic Arc-Welding Alloy Steel Plates.** Howard L. Miller. *Welding Journal,* v. 27, Nov. 1948, p. 916-920.

Development of high-strength weldable alloy-steel plate. Unrestrained welding conditions, low-hydrogen type flux, and small deposits are helpful in borderline cases. Ferrite-forming alloys are preferable to the carbide-forming alloys.

**22b-352. Welding the Modern Diesel Locomotive.** H. S. Swan. *Welding Journal,* v. 27, Nov. 1948, p. 929-935.

**22b-353. Structural I-Beam Cutoff Machine.** George J. Strate. *Welding Journal,* v. 27, Nov. 1948, p. 936-941.

The above is an unusual oxy-acetylene machine designed to cut I- or H-beams from 10 to 36 in. on a steel-mill roll line. The unit produces a cut surface comparable to a cold saw.

**22b-354. Production Heli-Welding Stainless Steel.** Bernard Blickman and Newton Blickman. *Welding Journal,* v. 27, Nov. 1948, p. 945-950.

When to use inert-gas welding, manual or automatic welding; type of electrode.

**22b-355. Eccentric Guides Welding Head to Make Small Circular Welds.** *Welding Journal,* v. 27, Nov. 1948, p. 950.

**22b-356. Backups for Grooved Weld Joints.** Chester R. Austin and P. J. Rieppel. *Welding Journal,* v. 27, Nov. 1948, p. 555s-567s.

Tests of commercial refractories for backups of root welds in single-vee and double-vee butt joints in structural steel showed that none of these materials were entirely satisfactory. Improvements were obtained in a few cases by covering the refractories with a wash coating of wollastonite. Refractory cements, ramming mixes, refractory ceramic materials, and miscellaneous foundry materials were generally unsatisfactory. A large number of granular ceramic materials and mixtures were tried. Compositions of the most promising materials and properties of the welds obtained when using them.

**22b-357. Welded Boilers and Alloy Steels.** *Railway Mechanical Engineer,* v. 122, Nov. 1948, p. 110-113.

Locomotive builders and steel manufacturers present data on weldability and properties of alloy steels for use in welded locomotive boilers. Includes introduction and the following brief articles: Alloy Steels for Welded Boilers, Robert L. Heath, Steels and Their Edge Preparation, A. J. Raymo, Welding Tests of Nickel Steel, J. W. Crossett, Manganese-Vanadium Steel, T. W. Merrill, and Welding Stainless Steels, H. L. Miller.

**22b-358. Soldering Plated Articles.** *Electroplating and Metal Finishing,* v. 1, Nov. 1948, p. 708-710.

Recent British patent on a chemical-treatment method for application to sheet steel before electroplating. Soldered joints in such tin plate are ordinarily not as strong as those in hot-dipped plate, but use of the treatment described—anodic cleaning with $H_2SO_4$ and dipping in hot 5% $Na_2CO_3$—5% NaOH solution for 1 to 30 sec.—gives excellent results.

**22b-359. Welding Aircraft Storage Containers.** R. K. Kewley. *Iron Age,* v. 162, Nov. 18, 1948, p. 102-105.

Production methods and equipment for building airtight containers for storing Navy aircraft in fly-away condition.

**22b-360. Controlled Welding and Heating.** Arthur Q. Smith. *Steel,* v. 123, Nov. 22, 1948, p. 100, 103-104.

Use in fabrication of hollow steel aircraft propellers.

**22b-361. Focus on Spain; A Review of Welding Achievements.** Jose Martinex Paris and L. A. Lidstone. *Welding,* v. 16, Nov. 1948, p. 466-472.

Important welded structures and the general development of welding in Spain.

**22b-362. Grain Drying Equipment; An Unusual Application of Bailey Bridge Units.** R. J. Fowler. *Welding,* v. 16, Nov. 1948, p. 473-476.

Application of welding to construction.

**22b-363. Hardfacing Technique; Comparison of Modern Methods.** M. Riddihough. *Welding,* v. 16, Nov. 1948, p. 477-480.

Second part of a digest of a book entitled "Hardfacing by Welding".

**22b-364. Flash Welding Nickel Steels.** J. J. Riley. *Welding Engineer,* v. 33, Dec. 1948, p. 36-39.

Experiments in which a group of steels of Ni content varying from 0.10 to 9.0% were flash welded. All were welded without much difficulty, once proper schedules had been established. Welding schedules and physical properties of the welds.

**22b-365. Unusual Jobs Done Daily.** Fred M. Burt. *Welding Engineer,* v. 33, Dec. 1948, p. 40-43.

Procedures and equipment used in fabrication of oil-field machinery and supplies. One of the unusual setups is one in which high-tensile alloy steel is welded on a production basis while within an electric furnace.

**22b-366. Steel Stack for Glass Plant.** Gordon Galloway. *Welding Engineer,* v. 33, Dec. 1948, p. 52-53.

Erection of 175-ft. welded steel stack for 150-ton glass furnace.

**22b-367. Arc Welded Ark Royal.** E. D'Acre Lacy. *Welding Engineer,* v. 33, Dec. 1948, p. 56-58.

Original Ark Royal, a famed British aircraft carrier, was sunk during the war. Her successor, who retains the same name, is an 80% welded ship. Design and construction.

**22b-368. In This Corner—Silver Brazing.** S. Griswold Flagg. *Industry and Welding,* v. 21, Dec. 1948, p. 40-42.

Use of silver brazing and threadless fittings on 13 miles of refrigeration piping under new floor of Madison Square Garden.

**22b-369. Vanstone Joints for Stainless Piping Systems.** *Iron Age,* v. 162, Dec. 9, 1948, p. 110.

Joint-forming machine which eliminates necessity for welding and provides easily dissembled systems for the chemicals, food processing, and other industries.

**22b-370. Dimensional Changes in Steel—Effect of Welding and Local Heating on Residual Stress.** Leon C. Bibber. *Welding Journal,* v. 27, Dec. 1948, p. 1009-1024.

Changes which occur on repeated heating and cooling and the reasons for irreversible changes in shapes and dimensions. Differential cooling tends to transform a cubical block of steel into a sphere, if repeated a sufficient number of times. Practical effects of welding and local heating were studied for structural members and plates. Method used to obtain quantitative data relative to the combined effect of weld metal and base metal.

**22b-371. Weldability of Cast Low-Alloy Steels.** V. T. Malcolm and S. Low. *Welding Journal,* v. 27, Dec. 1948, p. 1029-1033.

Physical properties and weldability of some of the newer cast low-alloy steels for high-temperature service.

**22b-372. Diesel Locomotive Maintenance Welding.** R. L. Rex. *Welding Journal,* v. 27, Dec. 1948, p. 1034-1042.

Some of the more interesting welding applications in current maintenance practice.

**22b-373. Fabrication of Shipping Containers.** G. J. Green and D. H. Marlin. *Welding Journal,* v. 27, Dec. 1948, p. 1043-1048.

Design, fabrication procedure, and arc and resistance welding techniques for the production of a durable, weathertight 277-cu. ft. container.

**22b-374. ABC's of Straight-Line Cutting.** J. Villoresi. *Welding Journal,* v. 27, Dec. 1948, p. 1051-1052.

**22b-375. All-Welded Engineering Building.** R. H. Davies. *Welding Journal,* v. 27, Dec. 1948, p. 1052-1053.

**22b-376. Back on the Job Because They Were Braze Welded.** H. B. Gilson. *Welding Journal,* v. 27, Dec. 1948, p. 1054-1055.

Some typical braze-welded repair jobs.

## 22c—Nonferrous

**22c-29. Materials Joined by New Cold Welding Process.** A. B. Sowter. *Materials & Methods,* v. 28, Nov. 1948, p. 60-63.

Production of strong welds in a number of nonferrous materials, particularly aluminum and copper, by simple cold-welding method developed in Great Britain.

**22c-30. Inert Gas Welding Process For Copper Tanks.** *Western Metals,* v. 6, Nov. 1948, p. 26-27.

Use in production of Cu-alloy hot water tanks.

**22c-31. How to Weld Die Castings.** Larry Phillips. *American Machinist,* v. 92, Dec. 2, 1948, p. 72-73.

How Zn-base die castings can be successfully welded by the oxy-acetylene torch.

**22c-32. How to Weld Zinc Base Die Castings.** *Industry and Welding,* v. 21, Dec. 1948, p. 73-78.

Recommended procedures.

**22c-33. Tungsten Arc Welded.** Clyde B. Clason. *Welding Engineer,* v. 33, Dec. 1948, p. 60, 62.

Development of satisfactory process for arc welding tungsten filaments used in power tubes. "K Monel", a Ni-Cu alloy, met the requirements of a joining metal or alloy which would wet the tungsten and permit the wires to be joined at a temperature below their melting point.

**22c-34. Low-Temperature Properties of Lead-Base Solders and Soldered Joints.** R. I. Jaffee, E. J. Minarcik, and B. W. Gonser. *Metal Progress,* v. 54, Dec. 1948, p. 843-845.

Solders containing more than about 90% lead were found to retain their ductility and to increase in impact strength at temperatures as low as −295° F. In solders with as much as 50% tin, serious embrittlement and decrease in impact strength occur at subzero temperature. Breaking loads of soldered copper tubing at low temperatures are nearly independent of the kind of lead-base solder used for joining.

## 22d—Light Metals

**22d-73. Gas Welds in a High Strength Aluminum-Zinc-Magnesium-Copper Alloy.** J. Pendleton. *Welding Research* (Bound with *Transactions of the Institute of Welding*), v. 2, Oct. 1948, p. 87r-93r.

Welds were made in an Al alloy containing approximately 5.5% Zn, 2.8% Mg, and 0.5% Cu, using 18, 14 and 10 S.W.G. sheets (with a variety of heat treatments before and after welding) and examined mainly by means of tensile tests and hardness explorations. 20 ref.

**22d-74. Further Investigations on the Pressure Welding of Light Alloy Sheet.** R. F. Tylecote, *Welding Research* (Bound with *Transactions of the Institute of Welding*), v. 2, Oct. 1948, p. 94r-108r.

It was found that substantial improvement can be obtained by solution heat treatment of welds made with small reductions in sheet thickness in clad duralumin-type alloys. Attempts to weld high-purity aluminum between rollers at room temperature were successful and it is believed that cold welding may be possible with other forms of tool. Means of applying pressure welding industrially by use of an electrical "projection welding" machine to supply heat and pressure automatically. 13 ref.

**22d-75. The Practical Fundamentals of Aluminum Brazing.** N. F. Ritchey and C. Bruno. *Western Metals,* v. 6, Nov. 1948, p. 22-25.

**22d-76. Spot Welding Improves Quality of Strato Ships.** *Modern Industrial Press,* v. 10, Nov. 1948, p. 54, 56, 58-60.

Use in production of Boeing Stratocruisers and Stratofreighters.

**22d-77. Joining of High-Strength Aluminum.** *Iron Age,* v. 162, Nov. 18, 1948, p. 98. Based on "Investigations on the Welding of High-Strength Aluminum Alloys," PB92831, Library of Congress, Photoduplication Service, Publication Board Project, Washington, D. C. $8.75, photostat; $3.00, microfilm.

Recent work.

**22d-78. Torch-Brazing Aluminum.** G. W. Birdsall. *Steel,* v. 123, Nov. 29, 1948, p. 82-85.

Good and poor joint design, alloys of Al which can be brazed, jigs and fixtures, cleaning and brazing practice, and flux removal.

**22d-79. Inert Arc Goes Metal Arc.** Jesse S. Sohn and A. N. Kugler. *Welding Engineer,* v. 33, Dec. 1948, p. 54-55.

Development of a practical gun makes possible a new gas-shielded arc process with many possibilities for aluminum welding.

**22d-80. New Development in Inert-Arc Welding.** *Industry and Welding,* v. 21, Dec. 1948, p. 49-51.

New process involves feeding a consumable wire through the barrel of a welding gun. Filler metal carries welding current. "Aircomatic" process may be used for welding heavy sections of Al and Al alloys.

**22d-81. Torch-Brazing Aluminum.** *Reynolds Metals Technical Advisor,* v. 1, no. 9, [1948], p. 1-2.

Recommended procedures.

**22d-82. Arc Welding of Aluminium and Its Alloys.** A. Scharer. *Light Metals,* v. 11, Nov. 1948, p. 631-638.

Corrosion tests and welds in specific alloys. (To be continued.)

**22d-83. Optimum Flash Welding Conditions—The Importance of Temperature Measurements.** R. M. Curran, P. Patriarca, and W. F. Hess. *Welding Journal,* v. 27, Dec. 1948, p. 577s-592s.

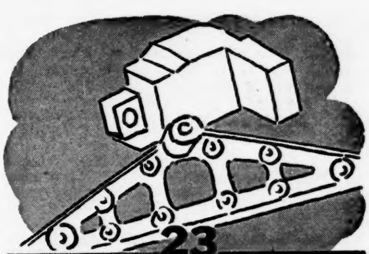
Results of a study of temperature distributions and the effect thereon of voltage, flashing distance, section size, clamping distance, and thermal properties in the flash welding of aluminum alloys.

**22d-84. High-Purity Helium for Welding.** William A. Mays. *Metal Progress,* v. 54, Dec. 1948, p. 848.

Advantages of welding-grade helium (99.8%+) recently made available by the Bureau of Mines, for shielded-arc welding of aluminum.

**For additional annotations indexed in other sections, see:**

**2a-24; 24a-245; 27a-155; 27b-49.**




# APPLICATIONS

## 23a—General

**23a-49. Metal Powder Parts Replace Those Produced by Other Methods.** H. R. Clauser. *Materials & Methods,* v. 28, Nov. 1948, p. 64-68.

Six case histories showing how metal powder parts can replace conventional metal forms by cutting costs and improving design and product quality.

**23a-50. Ceramics Get Seven-League Boots.** *Modern Industry,* v. 16, Nov. 15, 1948, p. 50-53.

Various new applications, including metal-ceramic combinations.

**23a-51. An Examination of Aluminum-Alloy Cables After 15 to 25 Years Service.** J. Hérenguel. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 151-154.

Previously abstracted from original French in *Revue de l'Aluminium,* v. 24, Dec. 1947, p. 357-360; v. 25, March 1948, p. 73-78. See item 23a-25, 1948. (Includes data on galvanized steel wires used as cable cores.)

**23a-52. People Get Hungry Together.** *Inco Magazine,* v. 22, no. 4, 1948, p. 22-23.

Applications of stainless steel and monel in miscellaneous restaurant, lunch-counter, and cafeteria equipment.

**23a-53. Materials at Work.** *Materials & Methods,* v. 28, Dec. 1948, p. 88-90.

Briefly describes and illustrates the following: all-metal door mat (Al and Zn); Ni-Cu alloy pickling hook; improved wave length standard from $Hg^{198}$; flat-plate welded fittings for natural-gas line; "densified wood" chucks for spinning Al parts; nailable steel flooring; phenolic pump parts; high-strength, low-alloy dipping basket for pickling; and W-Ni-Cu alloy of high density, high-tensile strength, ease of fabrication, and high corrosion resistance.

## 23b—Ferrous

**23b-64. How Stainless Steel Fixtures Solve Roof Drainage Problems.** Richard E. Paret. *Sheet Metal Worker,* v. 39, Nov. 1948, p. 38-40, 46.

Physical characteristics, fabrication, installation, cleaning, painting, and standard forms.

**23b-65. Spider Castings for Locomotive Armature Quills Withstand Severe Stresses.** *Vancoram Review,* v. 5, No. 4, 1948, p. 7.

Application of Mn-Mo-V steel.

**23b-66. Long Life to the Crushers.** *Inco Magazine,* v. 22, no. 4, 1948, p. 9.

Use of Ni-Hard (alloy-iron containing approximately 4½% Ni and 1½% Cr) for crusher rolls.

**23b-67. All-Steel Milk Trucks.** *Food Industries,* v. 20, Dec. 1948, p. 116-117.

## 23c—Nonferrous

**23c-71. The Noble Metals Find Increasingly Wide Use in Industry.** F. E. Carter. *Materials & Methods,* v. 28, Nov. 1948, p. 55-59.

Miscellaneous applications and useful properties.

**23c-72. Palladium Leaf; A New Metal in Book Decoration.** E. C. Rhodes. *British Printer,* v. 61, Nov.-Dec. 1948, p. 30-31.

**23c-73. 'Twas the Sale Before Christmas.** *Die Castings,* v. 6, Dec. 1948, p. 25-30, 64-66.

Series of articles on applications of Zn and Al die castings to toy manufacture: Famous Model Trucks; Pick up and Carry; Toy Lumber Carriers; Motorized Construction; and Fire Engines.

**23c-74. From Knights to Airplanes.** *Die Castings,* v. 6, Dec. 1948, p. 32, 34, 68-70.

Novelty die-cast cigarette lighters which resemble planes, cannons, knights in armor, etc. Production methods.

**23c-75. A Point Well Made.** *Die Castings,* v. 6, Dec. 1948, p. 37, 61-63.

Pencil sharpener with Zn die-cast housing and chromium plated plus enameled surface. How redesign effected savings.

**23c-76. Money in the Bank.** *Die Castings,* v. 6, Dec. 1948, p. 38-40, 71-73.

Novelty die-cast coin banks in Zn or Al.

**23c-77. Modern Industry Makes Important Uses of an Ancient Alloy.** *Inco Magazine,* v. 22, no. 4, 1948, p. 11-13.

Applications of bronzes containing nickel.

**23c-78. They Do More Than Protect Health.** *Inco Magazine,* v. 22, no. 4, 1948, p. 18-19, 28-29.

Uses of nickel and nickel alloys in a variety of types of commercial sterilizers.

## 23d—Light Metals

**23d-183. Le pouvoir cicatrisant de l'aluminium.** (The Healing Power of Aluminum.) J. E. Lescoeur. *Revue de l'Aluminium,* v. 25, Oct. 1948, p. 324-326; discussion, p. 326-327.

A number of cases in which aluminum was applied with great success in foil or plate form to wounds or burns.

**23d-184. Aluminum Die Castings for Electric Cleaners.** H. K. Barton. *Machinery* (London), v. 73, Oct. 28, 1948, p. 616-619.

**23d-185. Development of Magnesium Applications at Wright-Patterson Air Force Base.** Jay R. Burns. *Magazine of Magnesium,* Nov. 1948, p. 8-11.

**23d-186. You Can Print Under Water With Uni-Base.** William F. Clingman, Jr. *Photo-Engravers Bulletin,* v. 38, Nov. 1948, p. 12-14.

Use of newly developed magnesium mounting material, designed to withstand the high pressures and temperatures encountered with the newer methods of replica molding.

**23d-187. Gurley Instruments; The First Aluminum Consumer.** *Modern Metals,* v. 4, Nov. 1948, p. 27-29.

Uses of aluminum by instrument manufacturer.

**23d-188. Unconsidered Trifles.** *Light Metals,* v. 11, Nov. 1948, p. 589-591.

Several household and personal items which are made of aluminum in France and Italy.

**23d-189. For the Feast.** *Die Castings,* v. 6, Dec. 1948, p. 31, 66-67.

New kitchen tools and utensils in die-cast Al.

**23d-190. Aluminium Alloy Wire.** Frank H. Slade. *Machinery Lloyd* (Overseas Edition), v. 20, Nov. 20, 1948, p. 104-108.

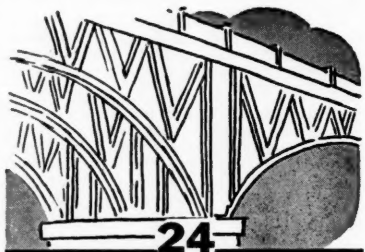
Advantages and miscellaneous applications.

**23d-191. The Steel Shortage: Can Aluminium Help?** E. D. Iliff. *Metal Industry,* v. 73, Nov. 26, 1948, p. 423-426.

The case for aluminum in construction of heavy equipment and structures, from the British viewpoint.

**For additional annotations indexed in other sections, see:**

**3c-119; 27a-158-160; 27c-19-20-23.**




## DESIGN and STRESS ANALYSIS

## 24a—General

**24a-237. Prescribed-Centrifugal-Stress Design of Rotating Discs.** C. M. McDowell. *Society of Automotive Engineers, Preprint,* 1948, 9 pages.

A mathematical method which may be applicable in other cases where thermal stresses are accompanied by centrifugal stresses.

**24a-238. Stress Investigations in Gas-Turbine Disks and Blades.** S. S. Manson. *Society of Automotive Engineers, Preprint,* 1948, 15 pages.

Information and experimental data.

**24a-239. Primary Creep in the Design of Internal Pressure Vessels.** L. F. Coffin, Jr., P. R. Shepler, and G. S. Cherniak. *American Society of Mechanical Engineers, Advance Paper* No. 48-PET-18, 1948, 24 pages.

Stresses and permanent strains at a particular time resulting from loading a thick-walled cylinder under constant internal pressure and elevated temperature when account is taken of the primary creep characteristics of a given material. The results are compared with permanent strains obtained by considering secondary creep as the general basis for pressure-vessel design. Methods formulated are shown to be suitable for design of pressure vessels intended for short life.

**24a-240. Engineers' Problems in the Measurement of Stress and Pressure.** J. G. G. Hempson, *Engineering,* v. 166, Oct. 29, 1948, p. 425-426. A condensation.

The various types of equipment used for dynamic measurements, including their applicabilities.

**24a-241. X-Ray Measuring Strains in Metal.** *Steel,* v. 123, Nov. 29, 1948, p. 79-80, 90.

How apparatus assembled at the National Bureau of Standards will be used in an effort to correlate progress of fatigue damage with surface strain measurements.

**24a-242. Design of Machine Parts on the Basis of Their Creep Strength.** (In Russian.) Yu. N. Rabotnov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences), June 1948, p. 789-800.

Attempts to correlate the theory of creep with experimental data in order to determine factors to be considered in design of machine parts.

**24a-243. Rocket Motors; Practical Design Problems and Their Solution.** George P. Sutton. *Machine Design,* v. 20, Dec. 1948, p. 101-105.

Basic components, welding-design requirements for proper flow of coolant, effect of high heat transfer on stresses in the walls, and selection of wall material and fabrication method.

**24a-244. Photoelasticity.** H. T. Jessop. *British Plastics,* v. 20, Nov. 1948, p. 513-518.

Use of plastic models to investigate stress distribution.

**24a-245. How to Design Levers.** *Welding Journal,* v. 27, Dec. 1948, p. 1049-1051.

A variety of designs for welded levers.

**24a-246. Centrifugal and Thermal Stresses in Rotating Disks.** W. R. Leopold. *Journal of Applied Mechanics,* v. 15, *(Transactions of the American Society of Mechanical Engineers,* v. 70), Dec. 1948, p. 322-326.

A general semigraphical method by which stresses can be determined. A typical example is calculated.

## 24b—Ferrous

**24b-109. The Behavior of Prestretched Structural Steel Beams.** R. L. Buchwalter and Y. C. Shiu. *Welding Journal,* v. 27, Nov. 1948, p. 522s-528s.

Results of several experiments conducted at Iowa State University. Results indicate that use of prestretched beams may permit use of much higher allowable design stresses. The stretching would normally be done at the mill.

**24b-110. Progress Report No. 1: Welded Continuous Frames and Components. Plastic Behavior of Wide Flange Beams.** W. William Luxion and Bruce G. Johnston. *Welding Journal,* v. 27, Nov. 1948, p. 538s-554s.

Extensive experimental results.

**24b-111. Design and Fabrication of Welded Lightweight Pressure Vessels.** J. J. Chyle. *Journal of the American Rocket Society,* Sept.-Dec. 1948, p. 90-106.

Previously abstracted from *Welding Journal,* v. 27, Oct. 1948, p. 831-837. See item 24b-100, 1948.

**24b-112. Bending Tests of Large Welded-Steel Box Girders at Different Temperatures.** Ambrose H. Stang and Bernard S. Jaffe. *Journal of Research of the National Bureau of Standards,* v. 41, Nov. 1948, p. 483-495.

Tests were made to determine the effect of constraint caused by geometrical shape and by differences in temperature on the ductile behavior of welded structures. The girders were tested as simply supported beams, one being tested at each of the following temperatures: −40, 0, 40, and 80° F.

**24b-113. Stronger Punch Press Frames, Less Strain as a Result of Strain Gage Testing.** *Machine and Tool Blue Book,* v. 44, Dec. 1948, p. 147-148, 150, 152, 154, 156.

Experiences of Diamond Machine Tool Co.

**24b-114. Collet-Chuck Spanner Wrenches Redesigned for Ease of Manufacture.** T. B. Hall. *Machinery,* v. 55, Dec. 1948, p. 186.

New wrenches are made from heavy-gage tubing by machining and welding. Cost savings over punched wrenches.

**24b-115. Alloy Steels Increase Shovel Capacity.** *Product Engineering,* v. 19, Dec. 1948, p. 90-92.

How modified armor-plate steels

were used to increase the capacity of Type 5561 Marion shovels from 35 to 40 cu. yd. Cutting effort at tip of dipper was increased 33% and operating range was also increased.

**24b-116. Design of Surface Broaching Tools.** *Machinery* (London), v. 73, Nov. 25, 1948, p. 733-737. Translated and condensed from article by Artur Schaltz, *Werkstatt und Betrieb*, v. 81, no. 1, 1948.

**24b-117. Reinforced Cast Iron.** Eugen Piwowarsky. *Iron Age*, v. 162, Dec. 9, 1948, p. 92-96; Dec. 16, 1948, p. 99-101. Translated and condensed from the German.

Reinforcement with cast-in steel inserts offers interesting possibilities for weight and material savings in structural shapes, pipe, and other applications. Increases in strength obtainable by this technique, and the effectiveness of various types of reinforcing media and pouring methods. Comments on some early work done by the Russians.

## 24c—Nonferrous

**24c-16. Die Casting Die Design. Part II. Movable Cores, Multiple Core Head Slides; Mechanical and Hydraulic.** H. K. Barton and James L. Erickson. *Tool & Die Journal*, v. 14, Dec. 1948, p. 52-54, 56-57, 72.

Described and diagrammed. (To be continued.)

**24c-17. How to Save on the Cost of Die Castings by Proper Design and Specification.** James L. Erickson. *Materials and Methods*, v. 28, Dec. 1948, p. 65-69.

Some of the factors involved.

## 24d—Light Metals

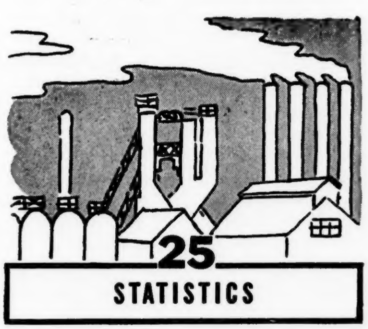
**24d-42. Light Alloy Pistons and Bearings.** *Light Metals*, v. 11, Oct. 1948, p. 568-573; Nov. 1948, p. 598-603. Based on article by Mahle in *Bergund Huttenmännischen Monatshefte*, Sept. 1948.

Technical and economic considerations, the latter mainly from the Austrian point of view.

**24d-43. The Stress-Strain Characteristics of a Magnesium Alloy Beam.** A. E. Johnson and D. C. Herbert. *Aircraft Engineering*, v. 20, Nov. 1948, p. 330-334.

Behavior when electrically and plastically deformed by a uniform bending moment at room temperature. Apparatus is described.

**For additional annotations indexed in other sections, see:**
**7b-242; 27c-22; 27d-23.**




## 25a—General

**25a-57. Raw Materials Problems of the Western Area.** Walther Mathesius. *Western Metals*, v. 6, Nov. 1948, p. 30-31.

**25a-58. Can Your Plant Do Its Own Plating?** Adolph Bregman. *Iron Age*, v. 162, Dec. 2, 1948, p. 99-101.

Dangers likely to be encountered in setting up a captive plating plant and considerations to be weighed before taking such a step.

**25a-59. Mineral Position of ECA Nations. No. 6. The Netherlands.** Paul Catz. **No. 7. Luxembourg.** Jules Spierkel. **No. 8. Belgium.** M. Helburn. **No. 9. Denmark.** H. Pasdermadjian. *Engineering and Mining Journal*, v. 149, Dec. 1948, p. 82-87.

Continues series of articles.

**25a-60. America's Mineral Resource Position. A Symposium.** *National Industrial Conference Board* (New York), *Studies in Business Economics* No. 18, 1948, 40 pages.

Contains the following contributions: Chairman's Remarks, Ralph J. Watkins; Aluminum and Magnesium, Irving W. Wilson; Copper, Lead and Zinc, Simon D. Strauss; Lesser-Known Metals and Minerals, Richard J. Lund; and Canada's Resources, Gilbert C. Monture.

**25a-61. Fundamental Work on Friction, Lubrication, and Wear in Germany During the War Years.** E. D. Tingle. *Journal of the Institute of Petroleum*, v. 34, Oct. 1948, p. 743-771; discussion, p. 772-773. Condensed from B.I.O.S. Final Report No. 1610.

General considerations, the mechanism of friction and lubrication, work on wear and dry friction, lubricant testing and oil deterioration; and a critical summary.

## 25b—Ferrous

**25b-91. A New French Iron and Steel Research Centre.** *British Steelmaker*, v. 14, Nov. 1948, p. 500-502.

Plans which are just getting under way.

**25b-92. Labrador Iron.** Herbert Yahraes. *Scientific American*, v. 179, Nov. 1948, p. 9-13.

Potentialities.

**25b-93. Steel Centers Skating on Thin Ice of Electric Power Shortage.** George F. Sullivan. *Iron Age*, v. 162, Nov. 25, 1948, p. 129-131.

**25b-94. Europe Faces 2 Million Ton Scrap Deficit According to Study by Steel Div. of UN.** *Iron Age*, v. 162, Nov. 25, 1948, p. 134-136.

Summary of 29-page study available from Steel Div., United Nations Economic Commission for Europe, Palais de Nations, Geneva, Switzerland.

**25b-95. Steel Industry Statistics.** *Steel*, v. 123, Nov. 29, 1948, p. 39-54.

Special section contains the first detailed statistics released by the American Iron & Steel Institute on the changes which have taken place in the steel industry since the end of World War II. These statistics taken from the Institute's new 1948 directory show capacity to produce pig iron, coke, steel ingots, and finished steel products for the entire industry, as well as for each individual company. Includes one page of Canadian statistics.

**25b-96. Pig Iron—The Future Outlook.** John A. Claussen. *Stove Builder*, v. 13, Dec. 1948, p. 74, 76, 78, 134, 136, 138.

**25b-97. Australian Iron and Steel. Part II. New Projects at Port Kembla, Whyalla and Elsewhere.** Charles Lynch. *Iron and Steel*, v. 21, Nov. 18, 1948, p. 505-506.

**25b-98. Scrap Iron and Steel in Canada.** H. McLeod. *Canadian Metals & Metallurgical Industries*, v. 11, Dec. 1948, p. 23-24.

Current position and statistics covering 1938-1947.

## 25c—Nonferrous

**25c-69. La politique des prix de l'association métallurgique avant, pendant et apres la guerre.** (Price Policy of the Metallurgical Association Before, During, and After the War.) (Also in German.) E. Suter. *Pro-Metal,* v. 1, March 1948, p. 22-26.

Policies of Swiss cartel for nonferrous metals and alloys in the period from 1930 to 1947, as affected by domestic and foreign relations.

**25c-70. Supply Outlook for Copper, Lead, Zinc.** Charles White Merrill. *Metals,* v. 19, Nov. 1948, p. 7-8, 10.

**25c-71. Finland's Ore Potential; Position of Non-Ferrous Metals Reserve.** *Metal Industry,* v. 73, Nov. 26, 1948, p. 426-427.

Based on annual report of the Director of the Finnish Geological Survey.

## 25d—Light Metals

**25d-23. Aluminum; Its First Sixty Years.** *Modern Metals,* v. 4, Nov. 1948, p. 17-19.

Introduction to a series of articles in current issue.

**25d-24. The First Aluminum Salesman.** Arthur V. Davis. *Modern Metals,* v. 4, Nov. 1948, p. 19-22.

History of aluminum and future prospects.

**25d-25. From Present Bottleneck to Greater Production.** Roy A. Hunt. *Modern Metals,* v. 4, Nov. 1948, p. 22-23.

Present status and future prospects for aluminum.

**25d-26. Aluminum & Competitive Materials.** Zay Jeffries. *Modern Metals,* v. 4, Nov. 1948, p. 24.

A brief discussion.

**25d-27. Aluminum Prices; The Industry's Record.** Irving Lipkowitz. *Modern Metals,* v. 4, Nov. 1948, p. 35-36.

**25d-28. The Aluminum Shortage. How Long Will it Last?** Samuel Moment. *Modern Metals,* v. 4, Nov. 1948, p. 39-40.

The effect of the current power shortage on aluminum production and how to relieve it.

**25d-29. Aluminum Ingot Outlook for Foundries and Die Casters.** *Modern Metals,* v. 4, Nov. 1948, p. 43-44.

Present price and supply situation, the reasons behind it; future prospects.

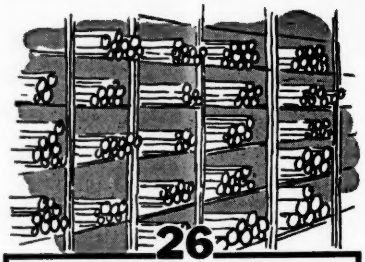
**25d-30. Nations Getting ECA Aluminum Exporting to U. S. at Premiums.** John Anthony. *Iron Age,* v. 162, Nov. 25, 1948, p. 137-138.

Big tonnages and sales at markups of 50 to 70% over domestic prices are said to be involved.

**25d-31. Secondary Aluminum Outlook for 1949.** Carl H. Burton. *Metals,* v. 19, Nov. 1948, p. 11-13.

Discussed by Secretary, Aluminum Research Institute. (To be continued.)





# 26 MISCELLANEOUS

## 26a—General

**26a-109. Recent Developments in Ferrous Metallurgy.** J. W. Donaldson. *West of Scotland Iron and Steel Institute, Journal,* v. 54, 1946-47, p. 1-5.

In alloy steels, hardenability, high-temperature alloys, precision casting, clad steels, induction heating, surface hardening, and inspection and control.

**26a-110. The Application of Metallurgy to Aircraft Design.** Leo Schapiro. *Aeronautical Engineering Review,* v. 7, Nov. 1948, p. 29-35.

Various metallurgical developments which have been applied in aircraft design in the present and past. Future prospects. Among the topics considered are precipitation-hardening requirements, atomic structure, single-crystal properties, mechanism of steel hardening, the new high-strength steels, high-temperature applications, and a new metal-manufacturing technique using a water-cooled copper melting chamber that also serves as a mold.

**26a-111. Consolidated's Research Plan.** R. D. Perry. *Mining World,* v. 10, Nov. 1948, p. 41-42.

Research organization, facilities, and some of the successful chemical and metallurgical developments of Consolidated Mining & Smelting Co., Ltd.

**26a-112. Bearing Tests Determine Safe Loads.** *Steel,* v. 123, Nov. 22, 1948, p. 88.

Graphical procedure and equipment at National Bureau of Standards for study of bearing performance through measurements of combined frictional and thermal behavior.

**26a-113. Logarithmico-Normal Distribution in Breakage of Solids.** Benjamin Epstein. *Industrial and Engineering Chemistry,* v. 40, Dec. 1948, p. 2289-2291.

A statistical model is constructed for breakage mechanisms and a breakage process is shown to depend on two basic functions. Results are applicable to a variety of problems, especially those involving desired or undesired crushing or breakage, for example, crushing of ore or degradation of coke. 15 ref.

**26a-114. Scanning The Field for Ideas.** *Machine Design,* v. 20, Dec. 1948, p. 106-109.

Air-jet control of edge position of sheet being processed over rolls; reducing vibration of machine tools for precision finishing by increased damping; gas-shielded, metal-arc, manual method for heavy sections of Al and Al alloys using special gun; self-aligning adjustable sleeve bearing and thrust bearing for precision grinders; and locking design for assembling head to its cylinder.

**26a-115. Mechanical Tubing as an Engineering Material.** H. R. Clauser. *Materials & Methods,* v. 28, Dec. 1948, p. 91-104.

Types and shapes of mechanical tubing that are available, the ways in which it can be worked and fabricated, and some typical applications. It also gives the principal characteristics and properties of the many different tubing materials.

## 26b—Ferrous

**26b-40. The Great Labrador Venture.** *Fortune,* v. 38, Dec. 1948, p. 114-121, 142-144, 146, 149-150.

How Canadian and U. S. enterprise are cooperating to develop Labrador iron ore.

**26b-41. Making While Mending; Section Mill Reconstruction at Appleby-Frodingham While Maintaining Output.** *Iron and Steel,* v. 21, Nov. 1948, p. 463-467.

How British steel rolling mill was rebuilt while production was maintained.

## 26c—Nonferrous

**26c-17. Le laboratoire des usines métallurgiques Suisses Selve & Co., Thoune.** (Laboratory of the Swiss Metal Fabricator, Selve & Co., Thoune.) (Also in German.) Theophil Zurrer. *Pro-Metal,* v. 1, March 1948, p. 32-41.

Facilities and work of laboratory, which is devoted to work on various nonferrous metals and alloys. Large folding chart gives compositions, physical and mechanical properties, applications, and standards for copper alloys produced commercially in Switzerland.

**26c-18. Research in the Non-Ferrous Metals Industry. The Position and Work of the B.N.F.M.R.A.** G. L. Bailey. *Metal Treatment and Drop Forging,* v. 15, Autumn 1948, p. 143-149.

First of series of articles which will survey research activities in and for the nonferrous industries of Great Britain.

**26c-19. Metallurgical Books.** (Concluded.) Sibyl E. Warren. *Metals Review,* v. 21, Nov. 1948, p. 39, 41, 43.

Final installment of book bibliography lists books on nonferrous metals published during 1936-1946.

**26c-20. Titanium—A Modern Metal.** Julius J. Harwood. *Journal of the American Society of Naval Engineers,* v. 60, Nov. 1948, p. 443-460.

Availability, preparation of ductile titanium, properties, corrosion resistance, present and potential applications, and government and industrial research programs.

**26c-21. Etalement des huiles sur les métaux.** (Spreading of Oils on Metallic Surfaces.) René Dubrisay and Francois Arlet. *Comptes Rendus,* v. 227, Sept. 6, 1948, p. 531-533.

The influence of small additions of higher aliphatic acids to pure paraffin oils was studied in connection with spreading on an electropolished copper surface.

*(Turn to page 56)*

# books . . .

## FOR *YOUR* METALLURGICAL LIBRARY

● **ACID ELECTRIC FURNACE STEEL MAKING PRACTICE. . .** by Conrad C. Wissmann

**This little book is a mine of information for melters and operators of acid electric steel melting furnaces. The book presents a simple set of instructions as an aid to those engaged in steel melting work. All of the problems discussed have to do with the operation of the furnace and the process of steel making. Mr. Wissmann tells of practices used in such operations as charging the furnace, tapping temperatures, low carbon heats, etc. Photographs and charts are used freely.**

**81 pages . . . 5 x 7 . . . 14 illustrations . . . paper binding . . . $1.50**

● **HEAT TREATMENT OF METALS. . .** a Symposium

**Ten popular heat treating lectures presented before the Los Angeles chapter of the American Society for Metals create a book that brings together the latest developments in this field. This book deals with the many types of heat treatment, discusses furnaces and induction equipment, covers both ferrous and nonferrous metals and metal forms.**

**Fundamental metallurgy connected with heat treatment is discussed. Various heat treatments are defined and their uses explained to illustrate how heat treatment amplifies the mechanical properties for the best practical application. Lavishly illustrated with charts and photographs, well indexed for reference.**

**178 pages . . . 6 x 9 . . . 103 illustrations . . . red cloth binding . . . $3.50**

● **ELECTRONIC METHODS OF INSPECTION. . .** a Symposium

**This new book is based on a series of seven educational lectures on electronic methods of inspection presented during the 28th National Metal Congress. The book outlines some of the important developments that have resulted in the last ten years as a result of the tremendous increase in interest in strain measurements in material and structural testing. Experts in the metal industry also discuss spectrochemical analysis of metals, uses of the cyclograph for testing of metals, supersonic methods of metal inspection, determination of seams in steel by magnetic analysis equipment, the electron microscope and electronics in liquid steel. The book contains many references and a comprehensive index for ready use.**

**189 pages . . . 6 x 9 . . . red cloth binding . . . $3.50**

● **METAL DATA SHEETS**

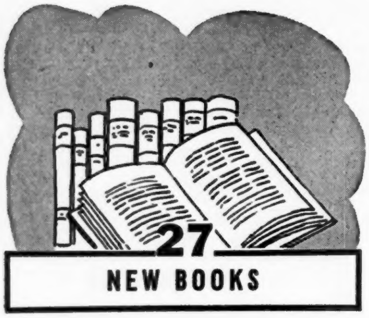
**This is a complete collection of 150 data sheets originally published in Metal Progress. Widely used in industry, these data sheets are now available in loose-leaf form on 8½ x 11 sheets, collected in an attractive folder for file reference. Each data sheet has been revised and a cross index of the entire contents is printed on the file folder. General scope of these data sheets includes physical-metallurgical data . . . forging . . . steel—compositions, structure, hardenability . . . machinability . . . heat treatment—quenching, tempering, annealing, carburizing . . . corrosion resistant steels and alloys . . . heat resistant steels and alloys . . . nonferrous metals—copper, zinc, nickel, aluminum, magnesium . . . electroplating . . . welding.**

**150 pages . . . 8½ x 11 . . . $5.00**

**SEND YOUR ORDER FOR THESE BOOKS TO**

# AMERICAN SOCIETY FOR METALS

**7301 EUCLID AVENUE** **CLEVELAND 3, OHIO**




## 27a—General

**27a-155. American Arc Welding Patents. Vol. I. Materials, Accessories. Ed. 2.** W. H. Simon, editor. 1948. Modern Technical Book Co., New York, N. Y. $22.60.

Welding patents up to 1948.

**27a-156. Theoretical Structural Metallurgy.** A. H. Cottrell. 256 pages. 1948. Edward Arnold & Co., 41-43 Maddox St., London W.1, England. 21s. net.

Treats a number of topics from the standpoints of the electron theory of metals and of the statistical thermodynamics of metals and alloys.

**27a-157. Quality Control in Production.** H. Rissik. Sir Isaac Pitman and Sons, Ltd., Parker St., London, W.C.2, England. 21s. net.

Concerned mainly with application to machine-shop operations. Considerable attention to the use of "relative precision index" as a measure of the capacity of the machine, together with its operator and the material, to meet specified limits or dimensional variation. Importance of instantaneous sampling in preference to random sampling in checking such factors as tool wear and resetting.

**27a-158. Allgemeine Werkstoffkunde.** (Principles of Industrial Materials.) Hans Stäger. 423 pages. 1947. Verlag Berkhäuser, Basel, Switzerland.

A basic but comprehensive text on their fundamental character and physical properties, including metals and alloys. Molecular theory, states of matter, metallic structure, fundamentals of plasticity, electrical and mechanical properties, corrosion, and heterogeneous gas-solid and liquid-solid systems. 237 ref.

**27a-159. 1948 Guidebook and Directory for the Metal Finishing Industries.** Ed. 17. 468 pages. 1948. Finishing Publications, Inc., 11 W. 42nd St., New York 18, N. Y. $1.50.

Polishing, buffing, and sanding; cleaning and pickling; electroplating solutions; surface treatments; control and testing; finishing plant engineering. Directories of trade names, manufacturers, and suppliers.

**27a-160. Engineering Materials. Ed. 2.** Alfred H. White. 686 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $6.00.

Chapters on alloy steels and light metals have been almost completely rewritten. Material on wood, plywood, other laminates, and protective coatings, is almost all new. Recent developments in the materials of airplanes, light-weight trains and prefabricated houses. Fundamental properties of solids; iron and iron-carbon alloys; manufacture of iron and steel; low-alloy steels; high-alloy steels; shaping and fabricating metals; the light metals; the soft metals; bearing metals; corrosion of metals and protection by inorganic coatings; organic protective coatings; plastics, laminates and synthetic coatings. (From review in *Materials & Methods,* v. 28, Nov. 1948.)

**27a-161. Turning and Boring Practice. Ed. 3 (rev.)** Fred H. Colvin and Frank A. Stanley. 531 pages. 1948. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.75.

Material that appeared in the War-Time Supplement has been placed in the proper sections. Many valuable data have been added. These include mandrel and taper work in lathes; precision boring to extreme accuracy; boring bars for special jobs; and further information on application of carbide tools to different classes of work. Coverage includes: operations that can be performed on engine lathes; turret lathes; automatic and semi-automatic lathes; horizontal and vertical boring machines; and precision, or single-point, boring machines. (From review in *American Machinist,* v. 92, Dec. 2, 1948.)

**27a-162. Machine Design.** Paul H. Black. 344 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.00.

Basic elements of machine design, including material on machine members and elements, materials and fits, and finishes.

## 27b—Ferrous

**27b-48. Prevention of Iron and Steel Corrosion: Processes and Published Specifications.** C. Dinsdale. 67 pages. Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S. E. 1, England. 5s. plus postage.

An attempt to compile a complete index of such methods and of standard specifications connected therewith. Methods of preventing corrosion, cleaning metal parts, and codes of practice.

**27b-49. The Fracture of Mild Steel Plate.** C. F. Elam Tipper. 82 pages. 1948. H. M. Stationery Office, London. (Report No. R.3.) 6s., 6d. Also British Information Services, 30 Rockefeller Plaza, New York 30, N. Y. $2.05.

Causes of brittleness of mild steel in connection with fractures of large welded structures, especially plates of welded ships. Descriptions of fractures in actual ship plate; experiments designed to reproduce similar fractures in the laboratory; development of a notch test and study of the conditions of test as applied to ship plate; metallurgical investigation of the plates; experiments on the effect of notches on ductility and fracture of mild steel; discussion of results; and tables.

**27b-50. Estudio de los yacimientos ferriferos de México. Fasc. III. Yacimentos del grupo del Pacifico Norte. Territorio N. de Baja California, Estados de Sonora y Sinaloa.** (Study of Iron Deposits in Mexico. Vol. 3. Deposits of the North Pacific Group. Territory of Northern Lower California, States of Sonora and Sinaloa.) Luis Toron Villegas and Adrian Esteve Torres. 309 pages and 101 maps. 1947. Banco de Mexico, Mexico City, Mexico.

Consists of 2 separate books: one, containing illustrations and description of deposits, physical-geological characteristics, geological history, and composition of ores; the other, containing topographical and geological maps of the specific areas investigated. Each individual deposit is studied from standpoint of available amount of ore, quality, exploration facilities, communications, etc.

## 27c—Nonferrous

**27c-18. World's Non-Ferrous Smelters and Refineries. Ed. 3.** 199 pages. 1948. Quin Press, Ltd., London, England. 17s., 6d.

Present edition is the first to be issued since the war. Contains information relating to over 250 undertakings in 40 countries. Authorized and issued capital, names of directors, description and location of plant, products, capacity, details of process, brands, descriptions and analyses.

**27c-19. Rhenium.** J. G. F. Druce. 92 pages. 1948. Cambridge University Press, Cambridge, England, 10s., 6d.

In chapter I the history of the element is recorded; chapter II is devoted to the isolation of the metal and a discussion of its properties. The inorganic compounds of rhenium are described in chapters III to VI, while a few organic derivatives are referred to in chapter VII. Practical applications of rhenium and rhenium compounds, together with relevant patents, are dealt with in the final chapter. Includes a bibliography of rhenium from 1925 to date.

**27c-20. Cobalt.** Roland S. Young. 190 pages. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. $5.00.

The occurrence, metallurgy, properties, and uses of cobalt. It deals with this substance from the standpoint of the metallurgist, geologist, chemist, soil engineer, physicist, biochemist, and analytical chemist. Recent advances in the fields of cobalt alloys and compounds for high temperature work, magnets, bright nickel plating, catalysts, livestock feeding.

**27c-21. Studies in Gold-Platinum Alloys.** C. G. Wictorin. 54 pages. 1947. Ivar Hoeggströms, Stockholm, Sweden.

A doctoral dissertation describing and discussing an experimental investigation on the phase diagram, kinetics of precipitation and temperature dependence of electrical resistance. 28 ref.

**27c-22. Practical Considerations in Die Casting Design.** 246 pages. 1948. New Jersey Zinc Co., 160 Front St., New York 7, N. Y. $3.00.

Specific designs and applications of die castings, of all alloys now in use; and practical considerations involved in the design of the products.

**27c-23. The Beryllium Industries of Germany and Italy.** H. A. Sloman and C. B. Sawyer. 144 pages. Office of Technical Services, Dept. of Commerce, Washington 25, D. C. (PB-2585.)

Progress from 1939 to 1945. Methods for capping aluminum pistons with a layer of beryllium one cm. thick. Use of beryllium in refractory manufacture. Production methods for manufacture of beryllium oxide, beryllium chloride, beryllium metal flakes, and both heavy and light Be alloys.

**27c-24. Non-Ferrous Metals and Alloys.** Edwin Gregory and Eric N. Simons. 196 pages. 1948. Paul Elek Publishers, Ltd., 37-38 Hatton Gardens, London E.C.1, England. 12s., 6d. net.

General principles of heat treatment, in which grain growth, annealing, induction heating, and reheating cold worked metals are discussed. Properties, heat treatment and hot and cold working of aluminum and its alloys. Copper—including the brasses and bronzes—is followed by nickel and the nickel alloys, monel, "K" monel, and inconel. Magnesium, solders, precious metals, bearing alloys, and Mn-Cu-Ni alloys.

USE THE HANDY COUPON BELOW TO OBTAIN THIS FREE HELPFUL LITERATURE

# MANUFACTURERS' LITERATURE

**187. Arc Welding**
Technical paper, "Development of the Gas Shielded Metal Arc Welding Process" now available in folder form giving complete details of new Aircomatic process. Air Reduction Sales Co.

**188. Burners, Oil-Gas**
Catalog 408 describes combination oil-gas burners which permit switching over quickly without change in equipment or loss of production. Hauck Mfg. Co.

**189. Colorimetric Methods.**
"Colorimetric Determination of Aluminum in Zinc Base Alloys" title of first in new series of research papers outlining laboratory experience with such methods, and giving details of tests, solutions, set-up and procedure. Can be obtained free on request in handy binder. Silverstein and Pinsof, Inc.

**190. Finishing**
A new manual illustrating and describing roto-finishing in detail with an outline of the four principal procedures—deburring and grinding, polishing, britehoning and coloring. Sturgis Products Co.

**191. Grinding**
ESA 55—New bulletin shows way to greater centerless grinding efficiency. Quotes field reports and suggestions for better grinding with wheel recommendations for all types of metal. Simonds Abrasive Co.

**192. Lab Furnaces**
Two new Leco box type furnaces are fully described in a 4-page leaflet; one designed for use in temperatures up to 2900° F., the other for temperatures up to 2600° F. Laboratory Equipment Corp.

**193. Metal Protection**
Set of seven new folders on metal preservation. Each one gives a brief description of specific metal-treating chemical, with complete illustrations. American Chemical Paint Co.

**194. Microscope**
New metallograph, recently introduced to American market, the Vickers Projection Microscope is described in 32-page brochure available on request. R. Y. Ferner Co.

**195. Nickel Plating**
"Practical Nickel Plating" is a new booklet on the subject of industrial nickel plating. It discusses solution compositions and operating conditions, and suggests cycles for treatment of the base metals prior to plating. International Nickel Co.

**196. Parts, Powder Metal**
"Applications and Properties of Nonferrous Powder Parts" is title of educational booklet. First part deals with technical aspects of nonferrous powders; the second half is devoted to case histories. New Jersey Zinc Co.

**197. Plating Rack Coating**
4-page leaflet describes "Enthonite 101" a new liquid plastic plating rack coating. Material also has extensive use for coating metals to resist severely corrosive organic materials. Enthone, Inc.

**198. Pulleys, Magnetic**
A complete description of features and applications of electromagnetic pulleys and Alnico magnetic permapulleys for automatic separation of ferrous and non-ferrous materials is given in two new 8-page catalogs. Dings Separator Co.

**199. Seam Welders**
An 8-page bulletin No. 804 describes new line of roller head seam welders which embody three basic sizes for light, medium, and heavy duty work, also available in three types—for circular, longitudinal welding, or both. Progressive Welder Co.

**200. Stainless Piping**
Bulletin 483, a new 4-page booklet includes drawings, dimensions and prices of new type fittings and flanges, available in Stainless 304, 347, 316 and other materials. Taylor Forge & Pipe Works.

**201. Surface Control**
New 8-page bulletin gives numerous practical advantages of shop control for surface roughness and waviness. Write for "More Profits to You Through Surface Control". Physicists Research Co.

**202. Tape, Insulating**
A new and improved orange-colored Wrap-Rax, a synthetic resin in easy-to-use tape form for insulating plating racks. Effective as a stop-off in hard chromium and other plating solutions. Hanson-Van Winkel-Munning Co.

**203. Welding**
All metal joining headaches eliminated in a new 8-page illustrated bulletin containing more than 60 illustrations of how new low temperature welding alloys can save defective equipment and machinery. Also featured is the new cutting electrode, Cuttrode, for cutting metals without the use of special equipment or oxygen. Eutectic Welding Alloys Corp.

**204. Welding and Cutting**
Large line of Victor gas welding and flame cutting apparatus shown in 4-color illustrations. Write for catalog form 20B. Victor Equipment Co.

**205. Welding, Inert Gas**
New bulletin on tungsten electrodes, showing improved technique and economy of new method using helium, argon, or atomic hydrogen. Fansteel Metallurgical Corp.

## READER SERVICE COUPON

**Metals Review, January 1949**

*Circle these numbers for manufacturers' catalogs described on this page.*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 187 | 189 | 191 | 193 | 195 | 197 | 199 | 201 | 203 | 205 |
| 188 | 190 | 192 | 194 | 196 | 198 | 200 | 202 | 204 | |

*Circle these numbers for information about new products described on pages 60-63.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 754 | 756 | 758 | 760 | 762 | 764 | 766 | 768 |
| 755 | 757 | 759 | 761 | 763 | 765 | 767 | 769 |

This coupon is void after April 15, 1949

YOUR NAME .................................... TITLE ..........

COMPANY ..............................................

STREET ..............................................

CITY AND STATE ..............................................

*MAIL TO METALS REVIEW, 7301 EUCLID AVE., CLEVELAND 3, O.*

# CHAPTER MEETING CALENDAR

| CHAPTER | DATE | PLACE | SPEAKER | SUBJECT |
|---|---|---|---|---|
| Akron | Feb. 9 | University Club | Ralph L. Lee | Metals and Humanics |
| Baltimore | Feb. 21 | Engineers' Club | V. N. Krivobok | Stainless Steels, Heat Resisting Steels, High-Alloy Steels |
| Birmingham | Feb. 1 | Hooper's Cafe | Harry P. Croft | Metallurgy and Applications of Copper Alloys |
| Boston | Feb. 4 | Hotel Sheraton | Leo P. Tarasov | Grinding Problems From the Metallurgical Viewpoint |
| Calumet | Feb. 8 | Phil Smidt & Son, Whiting, Ind. | | Use of Cutting Lubricants and Coolants in Machining of Ferrous and Nonferrous Metals |
| Canton-Massillon | Feb. 14 | | F. Schollenberger | Astronomy |
| Chicago | Feb. 14 | Furniture Club of America | Morris Schreve | Gem Stones |
| Cincinnati | Feb. 10 | Engineering Society | M. E. Carruthers | Stainless and Heat Resisting Alloys |
| Cleveland | Feb. 7 | Cleveland Club | C. H. Leland | Gas Carburizing |
| Columbus | Feb. 8 | Fort Hayes Hotel | J. H. Hollomon | |
| Dayton | Feb. 2 | Frigidaire Plant No. 2 | F. Howard McCormick | The Development of the Automatic Clothes Washer |
| Detroit | Feb. 14 | Rackham Educational Memorial | Harold K. Work | Officers' Night |
| Hartford | Feb. 8 | The Hedges, New Britain, Conn. | A. H. d'Arcambal, chairman | Quiz Program |
| Lehigh Valley | Feb. 4 | Hotel Traylor, Allentown, Pa. | Harold K. Work | Some Factors Affecting the Behavior of Steel During Cold Working |
| Los Angeles | Feb. 21 | Rodger Young Auditorium | Leon F. Reinartz | Steelmaking Practice |
| Louisville | Feb. 1 | | Francis B. Foley | Alloys for High Temperature Service |
| Mahoning Valley | Feb. 8 | V.F.W. Room | Chas. M. Parker | Raw Materials Supply for Steelmaking |
| Milwaukee | Feb. 15 | City Club | C. P. Larrabee | Corrosion of Ferrous Metals |
| Montreal | Feb. 7 | Queen's Hotel | | Titanium Metal |
| Muncie | Feb. 8 | Central High School | E. A. Hoffman | Cold Finished Bars to Physical Property Specifications |
| New Haven | Feb. 17 | Paradise Inn, Ansonia, Conn. | | Symposium—"Information Please" |
| New Jersey | Feb. 21 | Essex House, Newark | Walter Baird | Stamping and Forming |
| New York | Feb. 14 | Bldg. Trade Employers Assoc. | James B. Austin | Carbides and Nitrides in Steel |
| North Texas | Feb. 23 | Y. M. C. A., Dallas | M. H. Leavenworth | Silicones and Their Uses |
| North West | Feb. 17 | Covered Wagon, Minneapolis | J. W. Halley | Low-Alloy Steels |
| Northwest Pa. | Feb. 24 | Grey's Restaurant Meadville | C. E. Peck | Controlled Atmospheres |
| Notre Dame | Feb. 9 | Engineering Auditorium, University of Notre Dame | L. W. Eastwood | Microporosity in Ferrous and Nonferrous Castings |
| Oak Ridge | Feb. 16 | Ridge Hall | Stephen F. Urban | The Metallurgy of Titanium and Zirconium |
| Ontario | Feb. 4 | Royal Connaught Hotel | John G. Leschen | Physical Metallurgy |
| Ottawa Valley | Feb. 8 | Bureau of Mines | C. R. Whittemore | Application of Cobalt and Its Alloys |
| Penn State | Feb. 8 | Mineral Industries Art Gallery | M. F. Judkins | |
| Philadelphia | Feb. 25 | Engineers' Club | C. E. Birchenall | Radioactive Tracer Techniques in the Solution of Metallurgical Problems |
| Pittsburgh | Feb. 10 | Roosevelt Hotel | | Heat Treating Night |
| Purdue | Feb. 15 | Purdue Memorial Union Bldg., West Lafayette | | Castings Symposium |
| Rhode Island | Feb. 2 | | James V. Baxter | Practical Plant Metallurgical Control in Industry |
| Rockford | Feb. 22 | Hotel Faust | Leo P. Tarasov | Injury in Ground Surfaces |
| Rocky Mtn. | Feb. 18 | Oxford Hotel, Denver | | Student Night |
| Pueblo Group | Feb. 17 | Minnequa Club | Jack Lacy | Ladies' Night |
| St. Louis | Feb. 18 | Forest Park Hotel | Michael Fields | Metal Cutting |
| Southern Tier | Feb. 7 | Mark Twain Hotel, Elmira, N. Y. | Peter Payson | TTT-Curves |
| Springfield | Feb. 21 | Hotel Sheraton | | Precision Castings |
| Syracuse | Feb. 1 | Onondaga Hotel | B. W. Gonser | Nonferrous Developments |
| Terre Haute | Feb. 7 | Student Union, Indiana State | J. M. Hodge | The Hardening of Steel |
| Toledo | Feb. 24 | Maumee River Yacht Club | L. P. Tarasov | Grinding Problems From a Metallurgical Viewpoint |
| Tri Cities | Feb. 1 | Rock Island Arsenal Cafeteria | | Modern Concepts of Heat Treatment |
| Tulsa | Feb. 8 | | Stanley Brandenburg | Tungsten Carbides as Applied to Modern Machine Tools |
| Washington | Feb. 14 | Garden House, Dodge Hotel | E. E. Thum | Metallurgy as a Philosopher Might Look at it |
| West Michigan | Feb. 21 | | John Grodrian | Welding of Metals |
| Western Ontario | Feb. 11 | Cobble Stone Inn, Springbank | D. F. Cornish | Practical Applications of Copper, Brass and Bronze |
| Worcester | Feb. 9 | Sanford Riley Hall, Worcester Tech | Fred P. Peters | The Metallurgist's Place in the Changing Materials Picture |
| York | Feb. 9 | | Henry M. Heyn | Controlled Atmospheres |

## New Members of A.S.M Quarter-Century Club

The following A.S.M. members have been awarded honorary certificates commemorating 25 years' consecutive membership in the society:

**Philadelphia Chapter** — James E. Adams, Ajax Electric Co., (sustaining membership), Henry B. Allen, Fred W. Anderson, B. B. Bachman, Henry C. Boynton, Oscar Brewer, W. A. Buechner, James H. Campion, Brown Instrument Co. (sustaining membership), Walter Candlin, Carpenter Steel Co. (sustaining membership), William B. Coleman, Walter R. Coley, Arthur L. Collins, W. S. Crowell, Alfred G. Derr, William J. Diederichs, T. Watson Downes, E. B. Estabrook, V. B. Fisher, Francis B. Foley, W. B. Fox, J. M. Goodpasture, A. W. Grosvenor, W. B. Haag, John W. Harsch, Daniel Hartzell, J. H. Higgins, E. F. Houghton & Co. (sustaining membership), Richard C. Jordan, M. M. Kennedy, Horace C. Knerr, Leeds & Northrup Co. (sustaining membership), O. H. Lehmann, Stuart B. Mathews, A. Merzbacher, Norman L. Mochel, W. F. Oberhuber, Tinius Olsen Testing Machine Co. (sustaining membership), H. E. Parkison, Gustaf Peterson, Charles M. Putney, Walter C. Schmidt, Thomas C. Smith, Edward A. Snader, Charles H. Stoeckle, Haakon Styri, A. E. Tarr, W. Elmer Titus, William J. Walsh, Edgar T. Ward's Sons Co. (sustaining membership), Fred L. Wolf.

**Southern Tier Chapter**—John E. Halbing.

**West Michigan Chapter** — R. C. Banks.

## Cincinnati Junior Member Dies

E. Paul Keuper, 20, a junior member of the Cincinnati Chapter A.S.M., died on Dec. 5 following a six-month illness. He was a junior at University of Cincinnati, college of engineering.

## IMPORTANT MEETINGS for February

**Feb. 13-17—American Institute of Mining and Metallurgical Engineers.** Annual Meeting, San Francisco. (Ernest Kirkendall, secretary, Metals Divisions, A.I.M.E., 29 West 39th St., New York 18.)

**Feb. 28-March 4—American Society for Testing Materials.** Spring Meeting and Committee Week, Edgewater Beach Hotel, Chicago. (R. J. Painter, assistant secretary, 1916 Race St., Philadelphia.

# EMPLOYMENT SERVICE BUREAU

**The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.**

## POSITIONS OPEN

### East

INDUCTION FURNACE MELTER: Operating supervisor for new installation. Must be familiar with stainless steel melting and capable of training operating personnel. Our employees know of this opening. Give full details of age, experience and education. Box 1-5.

METALLURGICAL GRADUATE: Interested in research and development work on a wide variety of steels and alloys, including those used for high-temperature service. Experience in elevated temperature testing, particularly creep testing, desirable but not required. State experience, education, age, marital status and salary expected. Box 1-10.

NUMEROUS TECHNICAL POSITIONS: Including director of chemical research and development, chemists, physicists, job engineers. For better positions Ph.D. or equivalent necessary with experience in field. Write Kellex Corp., 233 Broadway, New York 7, N. Y.

CIVIL SERVICE OPENING: Physical science administrator for Washington, D. C., and vicinity. Salaries from $5232 to $10,305. Four-year college course in physical science, mathematics or engineering, or four years of technical experience in the field, or equivalent combination is required. File applications with Civil Service Commission, Washington, D. C.

ALUMINUM SALES ENGINEER: Old established firm in downtown New York requires high-caliber experienced man with knowledge of fabrication, transformation and uses of aluminum, especially one trained in handling technical surveys and sale of aluminum ingots and semifinished products. Submit detailed resume. Our office knows of this advertisement. Box 1-80.

METALLURGISTS: Leading electronics manufacturer in Long Island, N. Y., needs metallurgists for development and research work on nonferrous alloys for electrical applications. Persons able to combine theory and practice desirable. Salary dependent upon education and experience. Address reply to Box 663, Room 1403, 220 West 42nd St., New York City.

### Midwest

WELDING ENGINEER: College graduate with stainless steel experience preferred. Must be familiar with resistance welding, inert gas welding, torch welding, brazing and soldering. To work with shop troubles concerning welding design or shop operations. Excellent job in an interesting field. State qualifications fully. Box 1-15.

METALLURGIST: With aircraft experience and supervisory capabilities, for new B-47 Stratojet bomber production program. Address reply to Employment Office, Boeing Airplane Co., Wichita, Kansas.

METALLURGISTS: Interested in doing research in welding metallurgy are invited to investigate the attractive vacancies in the well-equipped Battelle research laboratories. Excellent opportunities for professional growth, increasing responsibilities and advancement. All inquiries acknowledged promptly and treated confidentially. Write Battelle Memorial Institute, Industrial and Scientific Research, 505 King Ave., Columbus 1, Ohio.

DIRECTOR OF PUBLICITY: For group of welding machinery and equipment manufacturers. Engineering background; advertising and publicity experience. Good speaker. To deal with engineers and management. Age 25 to 50. Office and travel expenses paid. Salary, $10,000. Box 1-60.

## POSITIONS WANTED

METALLURGICAL ENGINEER: Age 27, married, one child. B.S. in metallurgical engineering from Carnegie Tech. Six years of diversified experience in metallurgical research, development and engineering. Desires position in a progressive organization as product engineer or as technical assistant to an administrative or engineering executive. Box 1-20.

METALLURGICAL ENGINEER — FERROUS: B.S. in mining and metallurgy, master's in business administration. Married. Fifteen years' extensive experience in the steel industry—hot and cold rolled bars, billets, sheet, plate, structurals, carbon, alloy and stainless steels including laboratory production, sales, customer service, administration, advertising, industrial relations and sales training. West Coast location preferred. Box 1-25.

SALES ENGINEER OR REPRESENTATIVE: Age 39. Ferrous and nonferrous products or raw materials. Fifteen years' experience in industrial sales, purchasing supervision and expediting of productive and nonproductive parts, assemblies, equipment and machine tools, in automobile, refrigeration and farm equipment fields. Location—Detroit to cover Michigan or Ohio. Box 1-30.

JUNE GRADUATE: In metallurgical engineering wishes connection leading to metal sales in Virginia-Carolina area. Age 35, married, one child. Twelve years' experience in nonrelated sales. Box 1-35.

MECHANICAL - METALLURGICAL ENGINEER: M.E., M.S. in metallurgy (graduate in Feb.) desires position in West. Excellent background in metals and metal working, both theoretical and practical. Five years' experience includes teaching, production, and research work in ferrous and nonferrous metallurgy, and powder metallurgy. Resume on request; available immediately if desired. Box 1-40.

METALLURGICAL ENGINEER: M.S., Carnegie Institute of Technology. Age 25. Three years' experience including fifteen months of fundamental physical metallurgical research in aluminum. Desires position in industrial research, production or sales engineering with opportunity of advancement. Excellent references. Now located on West Coast. Available soon. Box 1-45.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering. Age 27, married. Three and one-half years' experience in steel mill, forge shop, iron foundry and industrial plant in metallography, physical testing, report-specification writing, failure investigations, trouble shooting, research, development, heat treatment including cyaniding, gas-liquid carburizing, flame and induction hardening, materials selection, customer contact work. Includes carbon, alloy, stainless, tool, die steels and cast iron. Desires responsible position as metallurgist or sales engineer. Box 1-50.

PRODUCTION MANAGER — INDUSTRIAL MANAGEMENT ENGINEER: Practical metallurgist. Age 42. Thoroughly qualified on all phases of metal fabrication, assembly, finishing. Fourteen years' experience in supervisory positions. Has handled 1200 men. Excellent production and industrial relations record. Top references. Available immediately. Box 1-55.

MANUFACTURERS' REPRESENTATIVE: 1939 graduate metallurgical engineer now representing industrial furnace manufacturer in Michigan desires additional correlated lines. Box 1-65.

METALLURGIST: Age 34, married. Four years college work, metallurgical engineering. 14 years diversified experience in heat treatment of tools, dies, production items, and nonferrous metals. Progressive, efficient. New York—New Jersey area preferred. Box 1-70.

PRODUCTION METALLURGICAL ENGINEER: Sixteen years experience in all phases of production, including quality control, specifications, induction hardening, heat treating, and metallurgical research. Desires responsible permanent position with company seeking a production control metallurgical engineer to lower manufacturing cost and to control quality. Box 1-75.

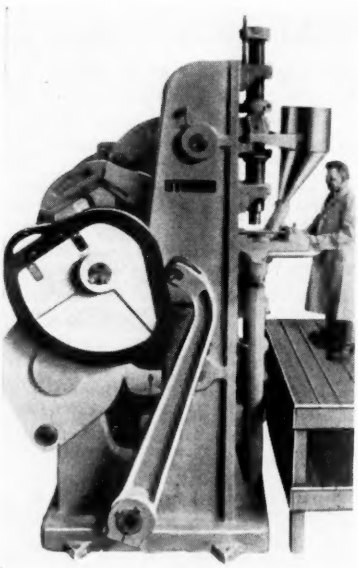
# NEW PRODUCTS *in Review*

## 754. Powder Metal Press

Design changes have been announced in the Stokes P-3 cam-type powder metal press.

Air cylinders are used in place of springs for holding rocker arm on both upper and lower cams, shaker cams and core rod cams. Smoother press action is provided and spring breakage is eliminated.

The use of twin-disk clutch and brake as standard equipment helps



take the load off the motor, since the flywheel is allowed to come up to full speed before the clutch engages. Punches and dies can be adjusted while the flywheel is running.

Press core rods have been strengthened to take up to 15 tons as a movable core rod and 30 tons as a stationary core rod.

The motor is smaller in size, being of the high slip type coupled with a heavier flywheel.

Other improved features include hydraulic release on the upper punch, and steel cam blocks bolted on cam bodies by bolts coming from underneath so that the cam face presents a smooth, unbroken surface.

The improved P-3 powder metal press has a maximum depth of fill of 8 in. and maximum diameter of piece of 4 in.

**For further information write F. J. Stokes, F. J. Stokes Machine Co., 6006 Tabor Road, Philadelphia 20, or use coupon on page 57, circling No. 754.**

## 755. Electrical Contacts

Gibsiloy UW6 electrical contacts, made from copper-tungsten by the powder metallurgy process, will interrupt heavy currents with minimum erosion. High contact forces and sliding, wiping action on opening and closing are recommended for outstanding resistance to galling and wear. Gibsiloy UW6 has the following properties: hardness, approximately Rockwell B-90; conductivity, 50% I.A.C.S.; cross breaking strength, 135,000 psi.

The lower cost of copper-tungsten is an important advantage when the conditions of application do not demand the use of one of the more expensive refractory contact materials such as silver-tungsten and silver-molybdenum. Gibsiloy contacts are molded to shape and one surface is coated with silver solder to facilitate brazing.

**For further information write George Williamson, Gibson Electric Co., 8362 Frankstown Ave., Pittsburgh 21, or use coupon on page 57, circling No. 755.**

## 756. Cleaning Compound

A new cleaning and phosphate coating material for use on steel and other ferrous metals to provide a base for paint coating is known as Detrex 79. It is a yellow, noncorrosive cleaning compound in dust-free powder form. It is used in heated water solutions at low concentrations and produces a light crystalline phosphate film.

This combination of efficiently removing light soils and oil films and at the same time depositing the tightly adhering phosphate coating on the cleaned base metal is of obvious advantage in reducing cost, time, and number of operations in a production setup.

The solution may be used in open tanks or continuous washing machines, especially of the spray type. The parts come from the process with a clean water-wet surface that dries to a uniform blue-gray finish.

Use of chromic acid after treatment with Detrex 79 is optional. Salt spray tests have shown exceptional rust inhibiting properties in painted surfaces that have been given this combination cleaning and phosphating pretreatment.

**For further information write George Walter, Detrex Corp., Detroit 32, or use coupon on page 57, circling No. 756.**

## 757. Brazing an Ice Floor

A new concrete-embedded piping system for freezing ice was recently installed in Madison Square Garden, New York. This job involved the laying of 13 miles of 1¼-in. galvanized wrought iron pipe placed 4 in. on centers over the entire arena floor. An innovation in this new piping system involved the use of 3000 Easy-Flo brazed Flagg-Flow threadless malleable iron fittings which were used to join the 20 and 40-ft. lengths of pipe.

By eliminating thread cutting, and thus retaining full wall thickness of the pipe, full strength is also retained. Leak-tight joints were obtained between pipe and fittings by sweating in the high-strength silver brazing alloy with oxy-acetylene torches.

Continuous testing was carried on during and after fabrication. The piping system was then embedded in concrete and topped with terrazzo. The new floor and piping system are subjected to tremendous weights, vibration and temperature variations ranging from 10 to 70° F.

**For further information write F. T. Van Syckel, Handy & Harman, 82 Fulton St., New York 7, or use coupon on page 57, circling No. 757.**

## 758. Dip Treatment for Zinc

Unichrome Dip Compound 95 is used to produce corrosion resisting, conversion coatings on hot dipped zinc, plated zinc, and zinc die castings. By proper dilution of the compound the following finishes are produced: (*a*) on zinc plate, a clear bright finish that looks like chrominum or an olive drab; (*b*) on zinc die castings, a clear, bluish or olive drab finish; (*c*) on hot dipped zinc, a bright spangled or an olive drab finish; (*d*) on all zinc, a coating which serves as an excellent base for paint, lacquer, or enamel.

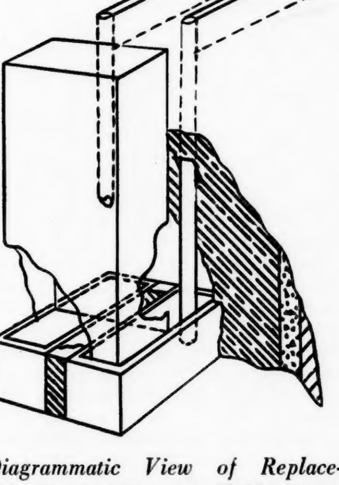
The process is said to be especially good for finishing wire goods, small parts, and parts on which it is economically impossible to deposit enough copper, nickel, and chromium to provide the necessary corrosion resistance.

**For further information write J. A. Williams, United Chromium, Inc., 51 East 42 St., New York 17, or use coupon on page 57, circling No. 758.**

## 759. Operating Data on Liquid Electrode Furnace

Operating data from field installations are now available on the Holden liquid electrode furnace first announced and exhibited at the National Metal Exposition in 1947. The economy of this furnace lies in the fact that the power conductors that transfer current to the pools which hold the liquid alloy electrode are entirely surrounded by refractory. Surface radiation area is reduced by 25%, and the cost of operation thereby similarly lowered.

Radiation losses are also reduced by the fact that the assembly bringing the power to the pools is entirely enclosed in the wall except for the terminal connection to the transformer. This accounts for approximately another 10% in power savings.

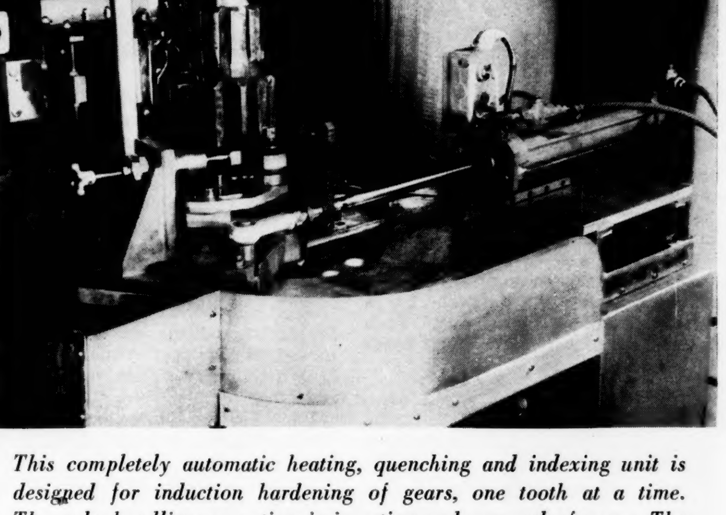


*Diagrammatic View of Replaceable Heating Unit for Holden Type 601 Liquid Electrode Furnace*

With the pool as well as the power carrying conductor bars thus entirely surrounded by refractory, they are sealed from air and salt circulation and their life thereby materially enhanced.

**For further information write A. F. Holden, A. F. Holden Co., New Haven 8, Conn., or use coupon on page 57, circling No. 759.**

## 760. Induction Hardening of Gears



*This completely automatic heating, quenching and indexing unit is designed for induction hardening of gears, one tooth at a time. The only handling operation is insertion and removal of gears. The machine uses 20-kw. equipment. Gears ranging from 20 in. diameter with a 12-in. face or larger can be accommodated. The machine may be mounted on any conventional sink table. Controls are contained in a cabinet attached to the unit. For further information write George Goodridge, Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y., or use the coupon on page 57, circling No. 760.*

## 761. Hastelloy and Multimet

Hastelloy and Multimet alloy drawn wire—for welding, metal-spraying, and the manufacture of wire screen, wire cloth, and springs—is now available in sizes down to 0.060 in. diameter from Haynes Stellite Co. The wire is furnished in coils or in cut and straightened lengths, either bare or flux-coated. Sizes below 0.060 in. diameter are supplied by an associate firm, Kemet Laboratories Co.

The Hastelloys are high-strength, nickel-base alloys, that resist severe chemical corrosion. They withstand the action of the common mineral acids, such as hydrochloric and sulphuric, over a wide range of temperatures and concentrations, and also oxidizing agents such as ferric chloride and wet chlorine. Alloy B, which contains nickel, molybdenum, and iron, is particularly resistant to hydrochloric acid; alloy C, a nickel-molybdenum-chromium-iron alloy, is specially suitable for applications involving oxidation. Both grades have excellent physical and high-temperature properties.

Multimet alloy is composed of cobalt, chromium, nickel, and iron. It was developed specially for use at high temperatures. In addition, it possesses excellent physical properties and is comparable in tensile properties to high-strength steels.

**For further information write J. W. Todd, Haynes Stellite Co., Kokomo, Ind., or use coupon on page 57, circling No. 761.**

## 762. Cleaner for Zinc

A new electro cleaner for zinc-base die castings, named Diversey No. 505, tends to condition the surface of the zinc for better adhesion to the electroplate. This cleaning-conditioning action helps eliminate blistering, peeling and discoloration on the surface of the final plate.

**For further information write L. A. Saylor, Diversey Corp., 53 W. Jackson Blvd., Chicago 4, or use coupon on page 57, circling No. 762.**

# NEW PRODUCTS *in Review*

## 763. Metal Parts Analyzer

The Model C Cyclograph is a new, portable instrument, operating on the core loss principle, for rapid and nondestructive metallurgical examination and sorting of metal parts.

The wide range of test frequencies available in the new instrument (2 to 200 kc.) makes it adaptable for a variety of nondestructive tests, such as checking or sorting of metal parts


on the basis of analysis, structure, hardness, or case depth.

In the expanding field of stress measurements, the Model C can be employed to trace internal stress changes, compare stresses at different levels, or measure stress in psi. (by calculation). A recorder output is provided for this use of the instrument.

**For further information write James W. Dice, J. W. Dice & Co., 191 River Rd., Grand View-on-Hudson, N. Y., or use coupon on page 57, circling No. 763.**

## 764. Strippers for Enamel

Two new room-temperature strippers for synthetic enamels are designated S-17 and S-19.

Stripper S-17 is a clear, quick-evaporating fluid that will remove all types of synthetic enamels, including heavy coatings that accumulate on work holders and hooks. It is particularly recommended for removing enamel from highly polished surfaces, such as brass, gold plate and silver. It does not tarnish metals and has no significant odor.

The other stripper, S-19, is similar in its action and appearance except that it is slightly ammoniacal and is used in certain special jobs where Stripper S-17 is not satisfactory. Both strippers are used with water seals to minimize evaporating losses, and rinsing is not necessary.

The work to be stripped is merely immersed in the strippers at room temperature. After a few seconds to several minutes, the enamel is completely removed from the surface of the metal and the parts can be removed. The stripper evaporates quickly and the part is then ready for refinishing.

**For further information write Walter R. Meyer, Enthone, Inc., 442 Elm St., Dept. MP, New Haven, Conn., or use coupon on page 57, circling No. 764.**

## 765. Laboratory Furnace

Pereco CB-55 electric laboratory and shop furnace is ready to use, with all necessary equipment and instruments built in. It can be heated from room temperature to 2500° F. in 2 hr., and up to 3000° F. for occasional flash firings. Heat is evenly distributed from six Globar elements, three each at top and bottom of the chamber.

A fully automatic, electronically operated indicating and controlling pyrometer is built in.

A pushbutton-operated meter gives accurate visual control over current

input, for identical repeat heat-ups. A 36-tap auto-transformer gives close control of power input and greatly prolongs the life of the elements.

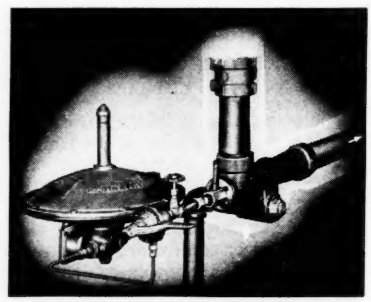
All controls and instruments are arranged on the front panel. The door is so carefully counterbalanced that it stays open at any position without fastening. It may be either foot or air-operated as desired.

**For further information write Andrew Pereny, Pereny Equipment Co., 893 Chambers Rd., Columbus 12, Ohio, or use coupon on page 57, circling No. 765.**

## 766. Oiltogas Converter

To help industry face the critical fuel situation, the new Oiltogas converter is offered to users of industrial ovens, furnaces and boilers now fired with gas, which do not lend themselves to the substitution of direct oil burners.

The Oiltogas converter simply supplies high-temperature air to the



*Insert Assembly (Where Vaporization Takes Place) Mounted to the Air-Gas Mixer of the Converter*

point in the piping where the gas and air ordinarily are mixed. At the same point, atomized oil is introduced into the hot air stream; it immediately vaporizes and burns in any type or style of gas burner. Existing burners and piping need not be altered, so that changing from gas to oil or back again is as simple as shifting gears.

The converter will vaporize and burn No. 1, 2 or 3 oil without forming carbon or condensate, and therefore there is no need for condensate return piping or periodic cleaning. The entire system is completely automatic.

The Oiltogas converter consists of one air heater assembly and as many insert assemblies as desired. This gives multiple zone control and no change in firing technique is necessary. These units are available in 1, 2, 4, 6 and 8 million B.t.u. capacities.

**For further information write C. W. Grimm, North American Mfg. Co., 4455 East 71 St., Cleveland 5, or use coupon on page 57, circling No. 766.**

## 767. Copper Welding Rod

A new internally fluxed rod for gas welding deoxidized copper is known as Silbrax. Its self-fluxing property prevents repeated rod oxidation and hence faulty weld metal. Since heat is applied first to the metal and then transmitted to the flux, Silbrax, keeps a proper balance at all times between melting metal and flux.

It is also used as a filler rod for carbon and inert-arc welding.

**For further information write Harold Snyder, Arcos Corp., 1500 South 50th St., Philadelphia 43, or use coupon on page 57, circling No. 767.**

## 768. Strippable Coating

A removable coating that can be sprayed, brushed or roll-coated on finished metal surfaces protects polished metal stock from die marks, scratches and abrasion during cupping, forming and drawing operations. It can be left in place from the mill to the point of sale, throughout fabrication, and can be hand-peeled off in large sheets or blown off with compressed air.

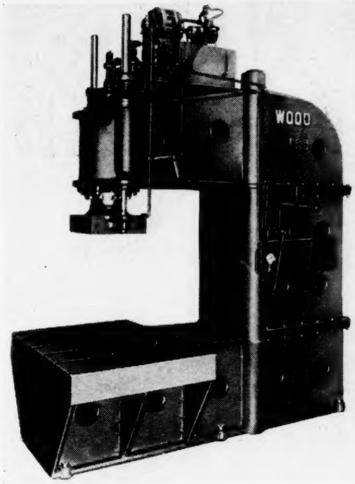
The compound has a synthetic resin base and a solvent vehicle and is available in a variety of colors. It forms a translucent film which is shock absorbent and abrasion resistant, with excellent resistance to water, gasoline and oil.

**For further information write W. E. Dent, Minnesota Mining and Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn., or use coupon on page 57, circling No. 768.**

## 769. Open-Gap Press

Furnished in various other sizes and capacities, the HydroLectric press shown is a 250-ton open-gap self-contained type used in flanging, bending or straightening operations.

The sizes of the table and ram head are 30x30 in., and 8x6 in. respectively. Operating hydraulic pressure




is supplied by a 2000-psi, two-stage rotary vane pump displacing 17.7 g.p.m. The pump, with a directly connected 1200-r.p.m. motor is mounted on a fabricated oil reservoir on top of the press.

This press is furnished complete with protective devices, safety valves, and pressure gage.

**For further information write R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, or use coupon on page 57, circling No. 769.**

### ADVERTISERS INDEX


| | |
|---|---|
| Alox Corp | 31 |
| American Chemical Paint Co. | 38 |
| Burrell Technical Supply Co. | 37 |
| Dietert Co. | 35 |
| Delaware Tool Steel Co. | 44 |
| Electric Furnace Co. | 43 |
| Enthone, Inc. | 32 |
| Eutectic Welding Alloys Corp. | 49 |
| Harshaw Chemical Co. | 39 |
| Holden Co., A. F. | Front and Back Covers |
| Institute of Metals | 49 |
| Laboratory Equipment Corp. | 38 |
| Oakite Products, Inc. | 33 |
| Ryerson & Son, Inc., Jos. T. | 17 |
| Sentry Co. | 38 |


~ ~ ~


**A. P. Ford, Advertising Manager**
**7301 Euclid Ave., Cleveland 3, Ohio**
**UTah 1-0200**

**Robt. S. Muller, Eastern Manager**
**55 West 42nd St., New York 18**
**Chickering 4-2713**

**Don Harway, West Coast Rep.**
**1709 West 8th St., Los Angeles 14**
**FAirfax 8576**
**57 Post St., San Francisco 4**
**Yukon 6-1069**